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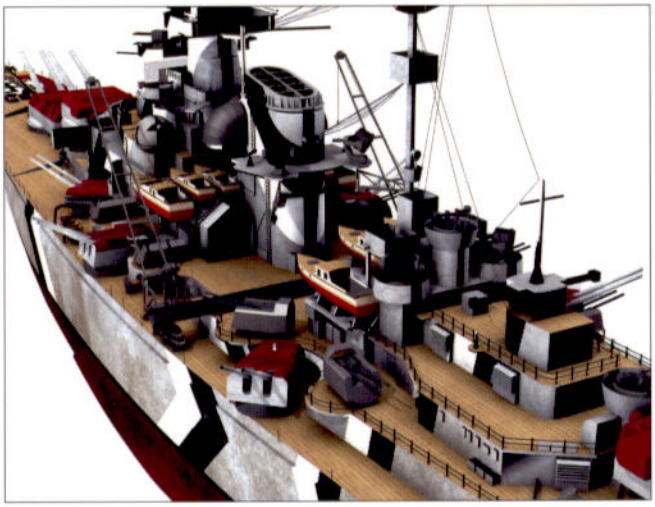
German Battleships 1939–45



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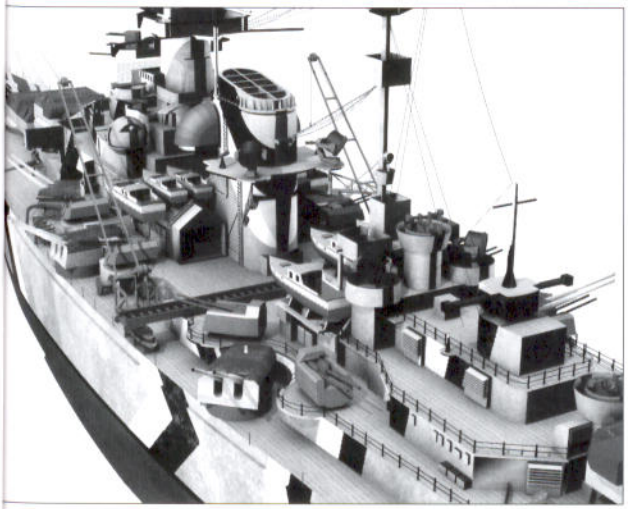

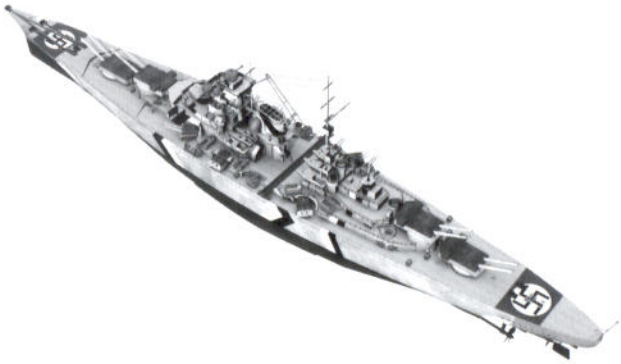

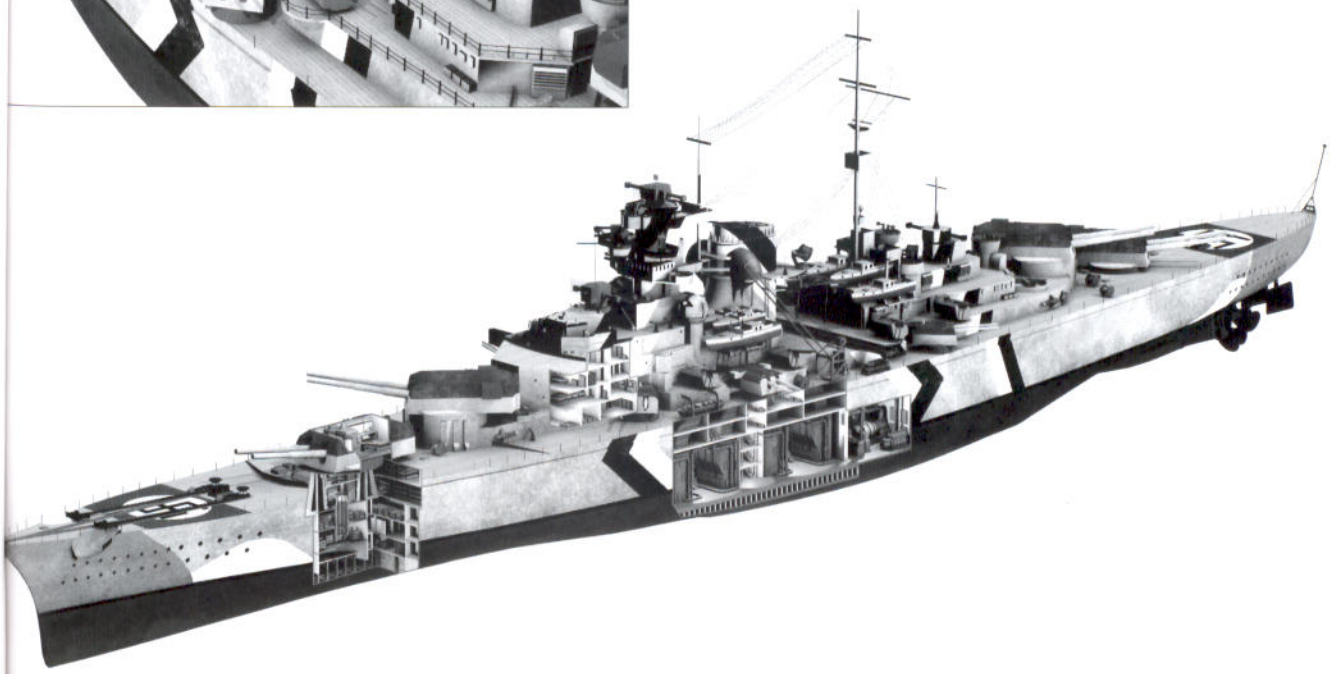

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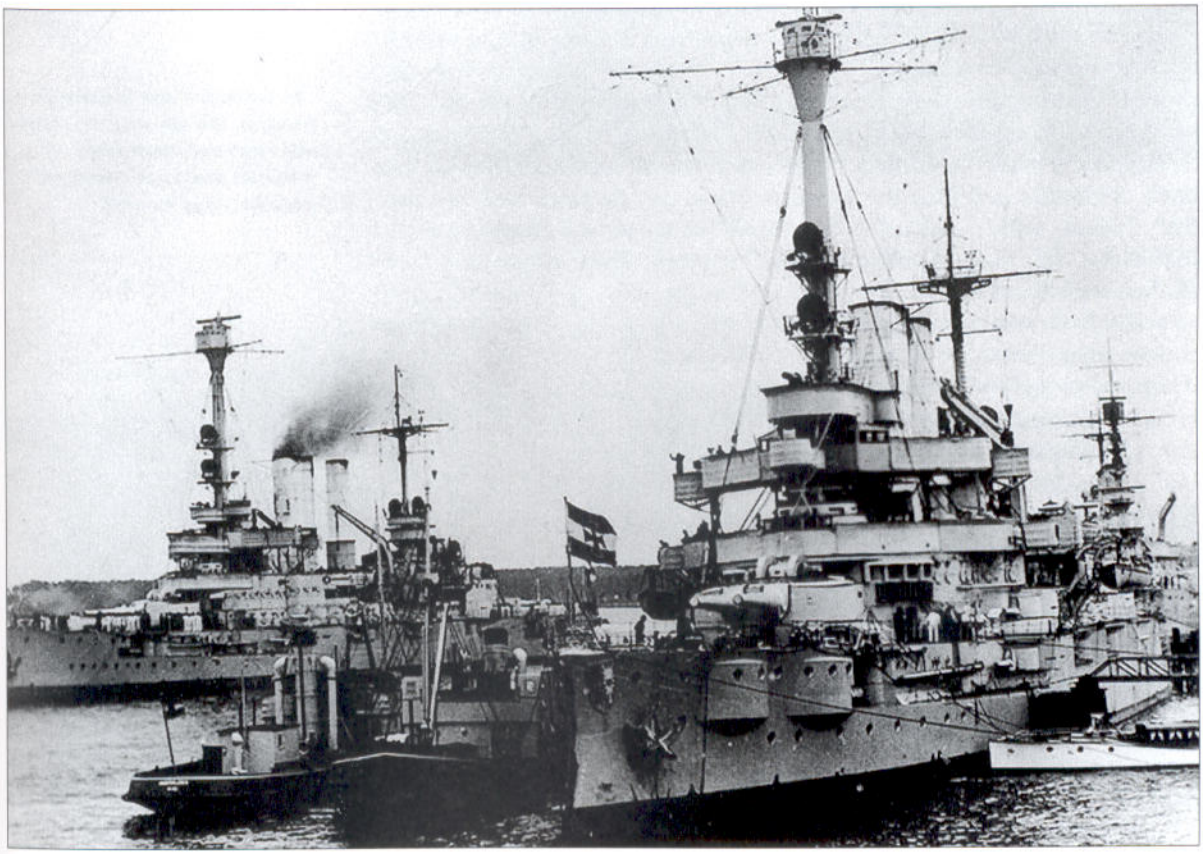
GERMAN BATTLESHIPS 1939–45

INTRODUCTION

Following the end of the First World War and the scuttling of the High Seas Fleet at Scapa Flow on 21 June 1919, the new Reichsmarine of the Weimar Republic was greatly restricted in the size of navy it was permitted. Those major warships that had not been scuttled were demanded by the Allies in recompense for those destroyed at Scapa, leaving Germany a handful of smaller, old and obsolete dreadnoughts built at the beginning of the 20th century. The purpose of the Reichsmarine, initially under the command of Admiral von Trotha and subsequently Admiral Behnke, was, in the eyes of the Allies, simply to defend Germany's coastline, so it was considered that a restriction to eight capital ships would be sufficient. A maximum tonnage of 10,000 tonnes was set on new builds. Existing capital ships were to be at least 15 to 20 years old before they could be replaced by newly built vessels so

The two dreadnoughts *Schlesien* (left) and *Schleswig-Holstein* (right) in their post-refit form, with the forward funnel removed. This pre-1935 photograph shows the old flag of the Reichsmarine being flown on the bow flagstaff.



that *Braunschweig, Lothringen, Preussen, Hessen, Schleswig-Holstein, Schlesien, Elsass* and *Hannover* would be required to serve for some years to come.

Accordingly, in the mid-1920s, these vessels were upgraded and modernised as far as possible. *Hessen, Schleswig-Holstein* and *Schlesien* were the only three still in service when the National Socialists came to power and Hitler set his sights on rebuilding the German Navy, but *Hessen* was taken out of service shortly thereafter, leaving only *Schleswig-Holstein* and *Schlesien* still in service when the Kriegsmarine was formally created in May 1935.

The terminology used to describe the vessels covered in this book may require some clarification. These elderly dreadnoughts were classified by the Germans as *Linienschiffe*, literally 'Ships of the Line'. As vessels officially classed as dreadnoughts, however, they certainly fall into the category of what is normally considered a battleship. The first major capital ships to be built for the German Navy after the end of the First World War were the so-called *Panzerschiffe*, which became widely known as 'pocket battleships' due to their very powerful armament. In reality, however, these could be more accurately classified as particularly powerful heavy cruisers, something the Germans themselves accepted when the *Panzerschiff* designation was dropped and they were reclassified as *Schwere Kreuzer*. Still commonly referred to today as pocket battleships, these are therefore not covered in this book and will be the subject of a separate title.

Following the *Panzerschiffe* came the *Scharnhorst* and *Gneisenau*, classified by the Germans as *Schlachtschiffe* or 'battleships'. Although extremely large and relatively powerfully armed, with 9 x 28cm guns, they would not be able to hold their own against 15-inch-gun battleships of the Royal Navy, nor indeed was it ever intended that they should. These vessels were more akin to a battlecruiser but are included in this work as they were officially classified by the Germans as battleships. Finally, of course, the most powerful warships ever to have been commissioned into the German Navy, the *Bismarck* and her sister the *Tirpitz*, fully warrant inclusion in any work dealing with battleships.

All of Germany's new capital ships were in fact designed as surface raiders, created to wreak havoc on enemy merchant shipping, but with sufficiently powerful armament to give a good account of themselves should they face enemy warships. However, it was never the intent that any of these ships should seek engagement with major units of the enemy navy. Germany's battleships were few in number and a scarce resource that required

The *Schlesien* and *Schleswig-Holstein*, though obsolete, were still large and impressive warships and drew onlookers wherever they moored.

careful husbanding. The single biggest contribution to the war that was provided by these vessels was probably in tying down substantial numbers of enemy warships in case they should break out into the open Atlantic, and in searching for them when and if they did. The *Bismarck* chase was a prime example of this.

THE DREADNOUGHTS

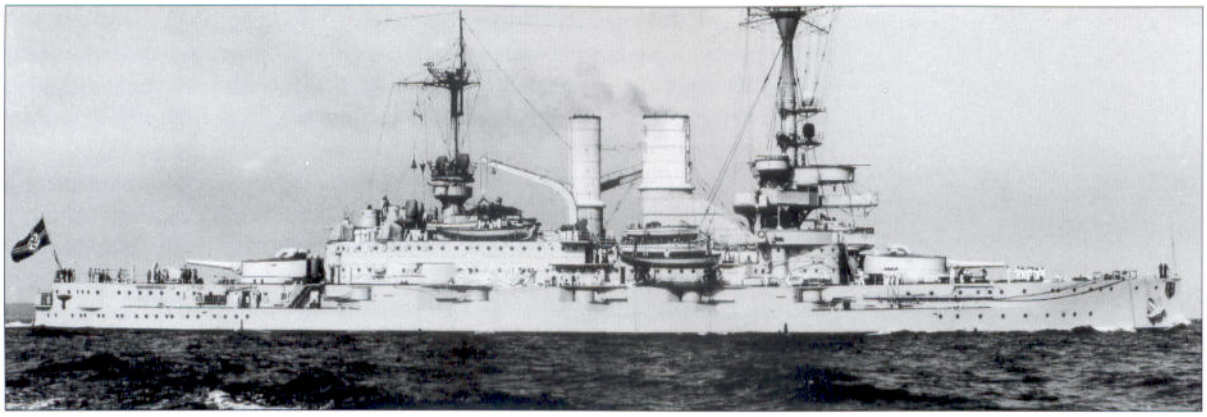
Although of the same class, the two veterans were built in different yards, *Schlesien* at the Schichau yard in Danzig and *Schleswig-Holstein* at the Germaniawerft in Kiel. The ships were both built as three-stackers but during refit both had the two forward funnels trunked into a single stack. The bridge area on each was also substantially remodelled. Both, as built, featured 14 x 10.5cm guns, ten of which were set into sponsons on the hull side. Although later reduced to three each side, this rather antiquated configuration was retained. By the outbreak of war, both *Schlesien* and *Schleswig-Holstein* had been relegated to training duties, being totally unsuited for modern naval warfare.

***SCHLESIEN* AND *SCHLESWIG-HOLSTEIN* SPECIFICATIONS**	
Displacement	13,040 tonnes
Length	125.9m
Beam	7.6m
Propulsion	3 x 17,000hp coal/oil-fired engines
Speed	16 knots
Armament	4 x 28cm guns in two twin turrets
	6 x 15cm guns
	10 x 4cm flak guns
	22 x 2cm flak guns
Crew	725

Linienschiff Schleswig-Holstein

On 1 September 1939 *Schleswig-Holstein* took its place in history when it fired the opening shots of the Second World War. The ship, under the command of Kapitän zur See Gustav Kleinkamp, was sent on what purported to be a ceremonial visit to Danzig to honour the anniversary of the sinking of the German cruiser *Magdeburg* in the Gulf of Finland in August 1914. Its crew having taken part in various ceremonies, including a parade accompanied by the ship's band, the *Schleswig-Holstein* was

An excellent broadside study of *Scharnhorst* as originally completed. At this point she was almost identical to *Gneisenau*.



Schleswig-Holstein after her refit. Note the new _Reichskriegsflagge_ being flown in this post-1935 photograph. Note also the large bronze eagle and swastika mounted on her hullside near the stern.

towed into a well-chosen firing position opposite the Polish fortress on the Westerplatte and an assault force of marines landed.

At 0447hrs on 1 September, *Schleswig-Holstein* opened fire at the Westerplatte fortress at a range of just 500 metres. Despite continued bombardment, the Polish defenders hung on tenaciously for fully seven days. At 1030hrs on 8 September, their fortress reduced to rubble, the Polish garrison surrendered. Incredibly, of the 200-man garrison, only 15 were killed. The Germans were so impressed by the gallantry of the Poles that the attackers stood to attention as the defenders marched out to surrender.

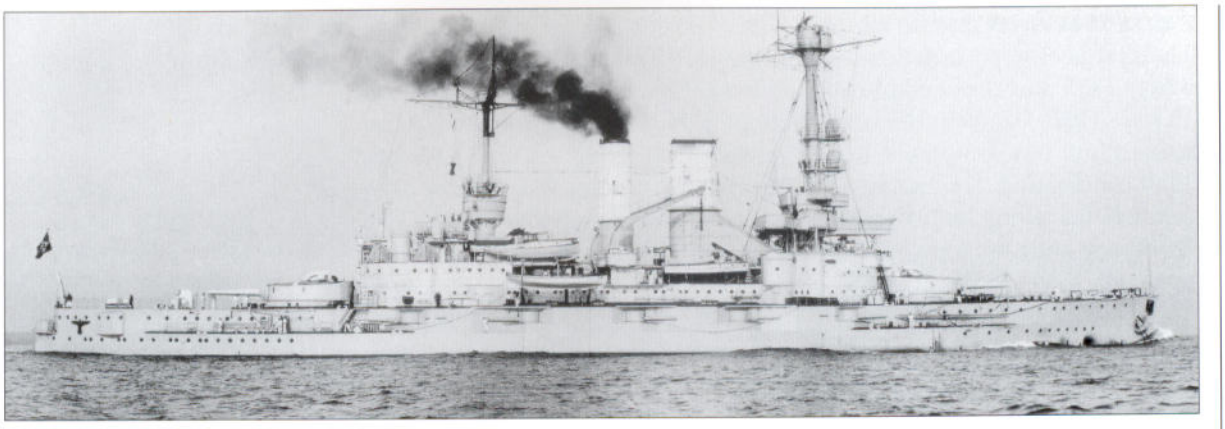
The *Schleswig-Holstein* subsequently took part in the occupation of Denmark before once again being relegated to training duties, as the flagship of the Chief of Training Units of the navy, a situation which continued until mid-1944 when her anti-aircraft armament was considerably enhanced with the intention of using her as a flak ship to provide additional anti-aircraft defences for the port of Gotenhafen. In December 1944, however, she was seriously damaged in a bombing attack and gradually settled on an even keel in Gotenhafen harbour, in water just 12 m deep. Although no longer mobile, she was still capable of using her armament, until finally a fire on board put her permanently out of action. The bulk of her crew was then sent to the front to assist with the defence of Marienburg.

Linienschiff Schlesien

The *Schlesien*'s wartime career was even less exciting that that of her sister. Used as a training ship for officer cadets until the beginning of 1940, she then spent a period of time acting as an ice-breaker for the U-boat fleet. She was used briefly during the invasion of Denmark until being withdrawn from active service in July 1940 and used as an accommodation ship.

In March 1941 she returned once again to service as an ice-breaker for a brief period before seeing limited service in the Baltic providing escort cover for minelaying operations intended to prevent any break-out by the Soviet Navy. Thereafter she was once again used as an accommodation ship in Gotenhafen. From 1941 until 1944 she was under the control of the Chief of Training Units of the navy.

As with her sister, in late 1944 her flak armament was significantly improved, and from early 1945 she helped provide improved anti-aircraft defence for Gotenhafen.



***Schlesien*, post-refit. The two sisters were virtually identical by this point.**

In April 1945, she moved from Gotenhafen to Swinemünde to restock with ammunition, and at the same time transported over 1,000 wounded soldiers back from the front for treatment. On 3 May she struck a mine north-west of Swinemünde and settled in shallow water. Like Schleswig-Holstein, her guns remained active and provided much needed fire support to army units.

THE *SCHARNHORST* CLASS

Designed to meet the restrictions of the Treaty of Versailles, which limited German capital ships to a maximum weight of 10,000 tonnes, the first of Germany's so-called pocket battleships, the *Deutschland* was one of the few pre-war German warships that genuinely did meet the restrictions on tonnage. The other *Panzerschiffe* which followed, *Admiral Scheer* and *Admiral Graf Spee*, significantly exceeding the weight limit due to the additional armour that had been fitted.

The appearance of the *Panzerschiffe* had provoked the French into producing large, new battleships of their own, designed to more than equal the power of the new German ships. This resulted in the Germans deciding against producing a fourth *Deutschland*-class vessel and instead to increase the size of the next two ships to double the displacement of *Deutschland*, at 20,000 tonnes. In the event, these proposed new vessels were broken up in 1934 whilst still on the stocks. In 1935, they were replaced by two even bigger vessels, planned at 26,000 tonnes and with the main armament increased from six to nine 28cm guns, in triple turrets of almost identical design to those in the *Deutschland* class. These ships were coded 'D' and 'E', the three *Panzerschiffe* being vessels 'A', 'B' and 'C' in the new construction programme. One major change in the new design, however, was a move from diesel power to steam turbines. Although these ships were designed partly with the restrictions of the Treaty of Versailles in mind, by the time work had commenced Hitler had openly announced his intention to re-arm and no attempt was subsequently made to adhere to the original tonnage limit. Subsequent negotiations between Germany and Great Britain, resulting in the Anglo-German Naval Agreement, retrospectively agreed the construction of these much larger warships.

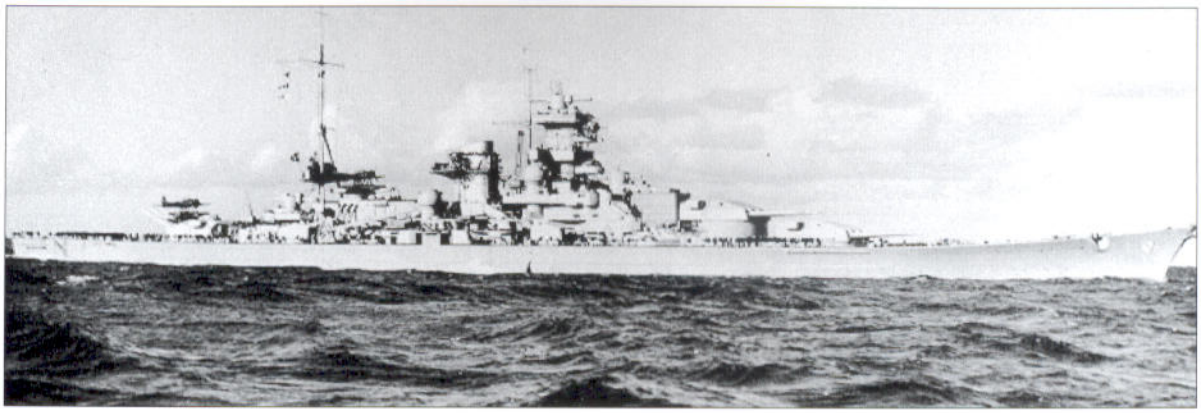
Schlachtschiff Scharnhorst

The first keel to be laid down was begun at Deutsche Werke in Kiel on 6 May 1935 and the second at Kriegsmarinewerft in Wilhelmshaven on 15 June 1936. Delays in the construction of the first vessel meant that the second hull was completed first. The vessel was launched on 3 October 1936, christened *Scharnhorst*. The launch ceremony was attended by Adolf Hitler along with the Minister of War, Generalfeldmarschall von Blomberg, with the widow of Kapitän zur See Schultz, commander of the Imperial Navy's SMS *Scharnhorst*, lost off the Falklands in December 1914. The ship carried a proud name. Gerhard Johann von Scharnhorst (1755–1813) was one of Germany's greatest military visionaries (though he never commanded an army in the field) and one of history's great social reformers. He was responsible for reforming the Prussian army and providing Kaiser Friedrich Wilhelm with the means to successfully oppose Napoleon Bonaparte.

The fitting out of the new battleship took just over two years and she was not finally commissioned until January 1939. During extensive sea trials, it was discovered that the ship had a tendency to take on considerable volumes of water over the forecastle in anything much more than a flat, calm sea. This caused some flooding of the areas below deck in the forward part of the ship and also caused problems with the electrics of the forward turret. Accordingly, *Scharnhorst* was taken back into dry dock and, whilst the usual post-commissioning final shipyard work was undertaken, the opportunity was taken to make some other improvements. Most important of these works, carried out in June 1939, was the fitting of a raised 'clipper' or 'Atlantic' bow, which greatly improved the ships graceful appearance but sadly did little to improve the problem of her shipping vast amounts of water in rough seas. This remodelling of the bow saw the forward anchors changed from two on the port side and one starboard, to one on each side. Each of the anchor hawses on the hull side was sealed and instead an anchor cluse positioned either side of the fo'c'sle. At the same time, a raked funnel cap was fitted and the mainmast moved from abaft the funnel to a new location further astern. Her hangar was also enlarged during these modifications.

Due to this refurbishment work, it was November 1939 before *Scharnhorst* was ready to put to sea, in the company of her sister, the *Gneisenau*.

A bow view of the *Scharnhorst* in her initial form with straight stem. The 'mattress' radar antenna for the FuMO system has not yet been fitted to the rangefinder on her foretop. During her refit, the anchors were also moved from the hullside ports to clunes on the edge of the deck.

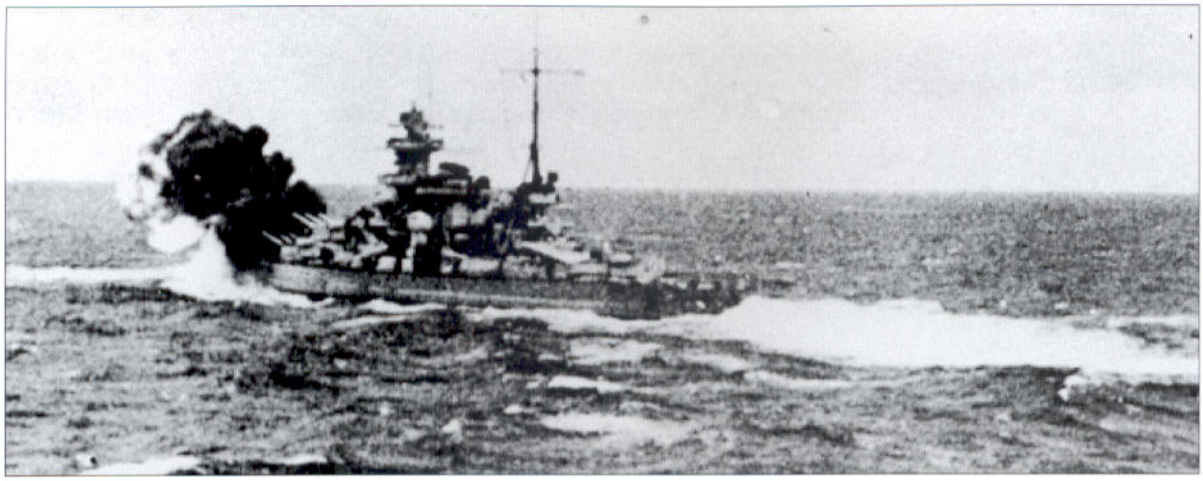


***Scharnhorst* in post-refit form with 'Atlantic' bow and angled funnel cap, but still retaining the second aircraft catapult on turret 'Caesar'. Although very similar to *Gneisenau*, her identity is immediately established by the siting of the mainmast, which on *Gneisenau* remained sited to the rear of the funnel.**

Escorted by the light cruiser *Köln* and nine destroyers, the battleships set off to patrol the area between the Faroes and Iceland. This sortie was intended to draw out elements of the British fleet and hopefully to ease some of the pressure on the *Admiral Graf Spee*, which was being actively hunted by the British in the South Atlantic.

On 23 November the Germans intercepted the armed merchant cruiser HMS *Rawalpindi* and, in a brief and totally one-sided gun battle, sent the plucky auxiliary cruiser to the bottom, drawing out almost the entire Home Fleet in pursuit. The German squadron successfully evaded the British and returned to German waters without further incident.

Scharnhorst's next major sortie took place in April 1940 during *Unternehmung Weserübung*, the occupation of Denmark and Norway. On 7 April, in company with *Gneisenau* and the heavy cruiser *Admiral Hipper*, the *Scharnhorst* steamed north in clear weather conditions. At around 1430hrs the German ships came under attack from RAF bombers. Fortunately for *Scharnhorst*, the aircraft concentrated their attack on the *Admiral Hipper*, and equally fortunately for *Hipper* the quality of the British bomb-aiming was appalling and no damage was done. By nightfall, weather conditions had deteriorated drastically as gale-force winds blew up and *Scharnhorst* suffered significant structural damage as well as flooding, which polluted some of her fuel supply. *Hipper* was detached at 0915 hrs on 8 April and sent to provide cover for the German destroyer fleet, loaded with mountain troops en route to Narvik, that had reported engaging enemy warships. In the early hours of the next morning the German ships encountered the British battlecruiser *Renown*. The British ship was providing escort cover for a Royal Navy operation to lay mines in neutral Norwegian waters. *Renown* opened fire, directing her shots at the *Gneisenau*. It was *Scharnhorst*, however, that first returned fire. The extremely heavy seas badly affected the accuracy of firing of all three ships, but it was the elderly *Renown* which first scored a hit, one of her 15-inch shells smashing into *Gneisenau* and damaging the rangefinder/gun director on the foretop. *Gneisenau* was hit twice more before *Renown* turned her fire on *Scharnhorst*. The superior speed of the German ships, however, allowed them to pull away gradually from their more powerfully armed adversary. Both the German sisters had suffered flood damage to their forward turret ('Anton') and were able to use only their single stern turret ('Caesar') to engage the enemy as they pulled away.



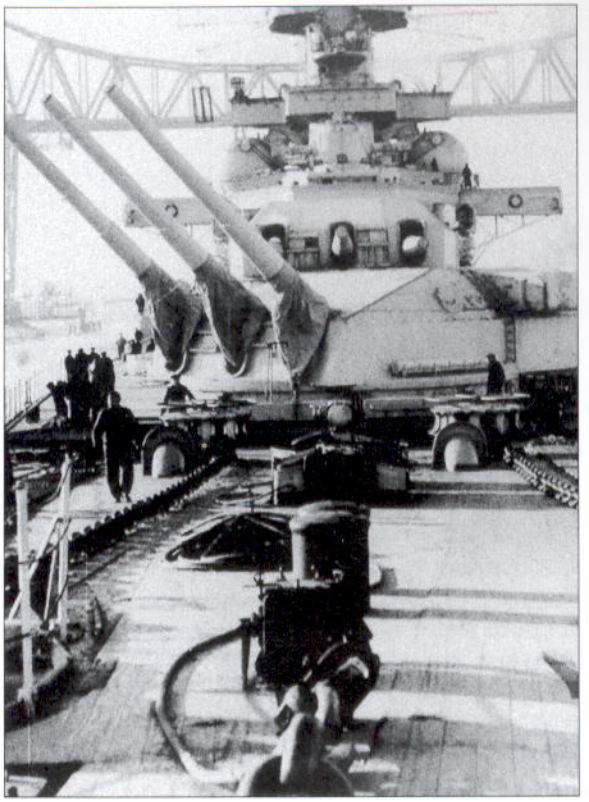
***Scharnhorst* at sea during the engagement with *Rawalpindi*. She has just fired a salvo from her forward main armament.**

On 9 April, at around midday, having reached a point to the north-west of the Lofoten Islands, the German squadron turned and sailed westwards for almost 24 hours, whilst carrying out essential repairs. The German ships then turned south and made for home, joining up with *Hipper* once again on 12 April. They were spotted by RAF aircraft and a considerable strike force of bombers was sent off in pursuit. Poor visibility acted in the Germans' favour and all three ships reached German waters unscathed.

Scharnhorst by this time needed considerable repairs at the Deutsche Werke yard in Kiel. At this time, the catapult fitted on the 'Caesar' turret roof was removed.

Scharnhorst was to see action again very shortly after her repairs and minor refit. On 4 June she set sail once again with *Admiral Hipper* and *Gneisenau* in a sortie designed to relieve the Allied pressure on German troops fighting in Norway, and especially the beleaguered mountain troops at Narvik. In fact, the Allies had already begun to withdraw from Norway and the German squadron steamed right into the midst of one small convoy of British ships comprising a troopship, a tanker and a corvette and sank all three. At this point, *Hipper* withdrew because of a fuel shortage, leaving *Scharnhorst* and *Gneisenau* to continue. Later that same day, the two German warships encountered the aircraft carrier *Glorious*, escorted by the destroyers *Acasta* and *Ardent*. Both German ships opened fire on the carrier, which was soon ablaze despite the destroyers' attempts to harass the enemy, and unable to launch any of her own aircraft. At 1822 hours, just 96 minutes after sighting the enemy ships, *Ardent*, badly battered by the 10.5cm secondary armament of the German ships, capsized and sank. *Scharnhorst* herself was unlucky enough to be struck on her starboard side just by turret 'Caesar', by a torpedo from *Acasta*, causing substantial flooding. Forty-six minutes later, *Glorious* was sent to the bottom and the uneven struggle finally came to an end at 1917 hours when *Acasta* was sunk.

The German ships returned to Trondheim on 9 June and emergency repairs on *Scharnhorst* were immediately commenced. During these repairs, *Scharnhorst* was struck by a bomb during an air raid but this failed to explode and no serious damage was done. After a stay of 11 days in the Norwegian port, *Scharnhorst* set sail for Germany, only to come under



The view towards the forward turrets 'Anton' and 'Bruno' from the bow of *Scharnhorst*, gives a good impression of the huge size of her main armament. Note that the canvas blast bags are fitted on the gun barrels of turret 'Anton' only. This shot also gives a good view of the large searchlight mounted on the face of her tower just above the bridge.

attack by British torpedo bombers. No hits on the battleship were achieved and one enemy aircraft was shot down. The ship reached Kiel safely on 23 June. The following several months were spent on repairing and refitting the ship and carrying out extensive crew training and sea trials.

On 22 January 1941 *Scharnhorst* put to sea, once again in the company of her sister, the *Gneisenau*, the two ships successfully breaking through into the Atlantic via the Denmark Straits in early February. Due to the typically heavy seas experienced in the Atlantic at this time of year, both ships suffered constantly from breakdowns caused by them shipping large amounts of water, the Atlantic bows they had both had retro-fitted providing little or no improvement to their seaworthiness. The German ships had been specifically ordered not to seek engagement with superior enemy forces and in accordance with these orders had turned away from convoys that were known to be escorted by capital ships. Nevertheless, *Scharnhorst* succeeded in sinking a total of eight enemy ships, accounting for some 49,000 tonnes, finally putting into the French port of Brest on 22 March 1941.

This new location was within easy range for enemy aircraft and *Scharnhorst* was targeted several times, fortunately with no effect. This good fortune was not to last, however, and on 23 July, shortly after moving to La Pallice, she was attacked by a force of 12 enemy four-engined bombers and suffered five bomb hits. Although there was some flooding, damage was not too severe and *Scharnhorst* was able to return to Brest for repairs. In dry dock, the opportunity was taken to upgrade her anti-aircraft armament whilst repairs were carried out.

The danger of air attacks on these heavy units forced the Germans to consider returning them to safer ports in German waters. Only two routes were available, northwards around the west coast of Great Britain and then down through the North Sea, or by a fast run along the channel coast and through the Straits of Dover. The second and preferred option, though it would bring the ships dangerously close to British shores, would also allow the Luftwaffe to provide strong air cover. The first option would have reduced the level of German air cover and risked the German ships encountering heavy elements of the British Home Fleet.

Accordingly, on 11 February, *Scharnhorst*, along with *Gneisenau* and the *Hipper*-class heavy cruiser *Prinz Eugen*, heavily escorted by destroyers, E-boats and minesweepers, set sail, initially meeting no opposition from the enemy. It was not until after the German flotilla had passed Calais that the first British reaction came. Although determined attacks were made by British destroyers and motor torpedo boats, supported by torpedo bombers, the British reaction had been too late. A submarine tasked with monitoring movements from Brest had withdrawn to charge

its batteries and had missed the departure of the German ships. By the time the British were alerted, the flotilla had reached the area in which they could be supported by a powerful presence from the Luftwaffe. The incident, known to the Germans as *Unternehmen Cerberus* and to the wider world as the 'Channel Dash', was not without its problems for the Germans, however, as both *Gneisenau* and *Scharnhorst* struck mines. In *Scharnhorst*'s case, the ship was in fact mined on two occasions, the second leaving her adrift for 45 minutes before she could once again get under way.

Finally, around midday on 13 February, *Scharnhorst* arrived in Wilhelmshaven and was moved straight into dry dock for damage inspection. As well as damage to the hull, several turrets had been dislodged from their bearings and the foundations for the main engines damaged. *Scharnhorst* was then moved to Kiel where repairs were carried out, and the battleship spent the remainder of the year in training exercises and sea trials.

Scharnhorst then spent a rather quiet period, two attempts to put to sea on war patrols in January being cancelled due to warning of impending air attacks. The fate of the Kriegsmarine's battleships was thrown into doubt after the abortive attack on a British convoy on 31 December in which the heavy cruisers *Admiral Hipper* and *Lützow* had been driven off by a relatively weak escort. Hitler, in a rage, ordered the scrapping of all heavy units and the weapons put to use in shore batteries. Grossadmiral Raeder resigned in protest, but fortunately his newly appointed successor, Commander-in-Chief of U-boats Grossadmiral Dönitz, persuaded Hitler to rescind his orders. Eventually, in March 1943, *Scharnhorst* succeeded in making the journey from Gotenhafen to Bogen near Narvik where she met with the heavy cruiser *Lützow* and the battleship *Tirpitz*.

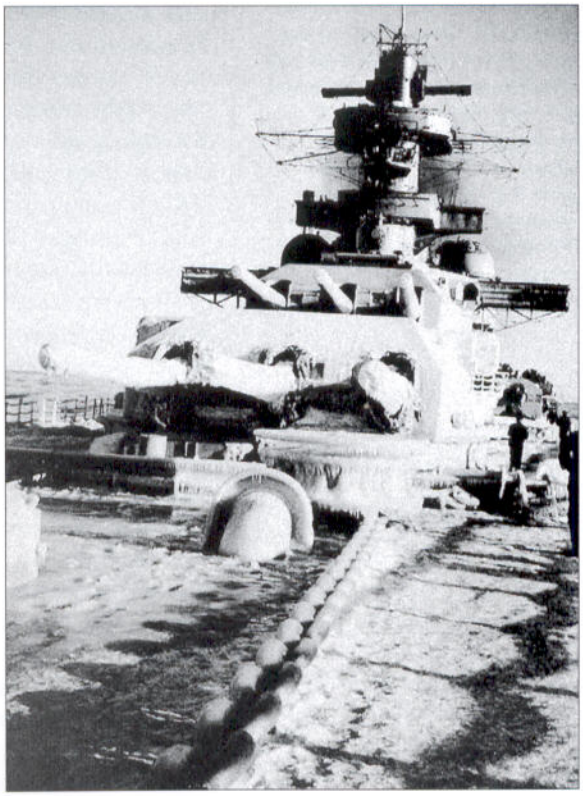
In April *Scharnhorst* suffered a serious internal explosion in a storeroom where flammable material was held. A number of crewmen were killed or wounded and serious fire damage was suffered in the forward crew accommodation area.

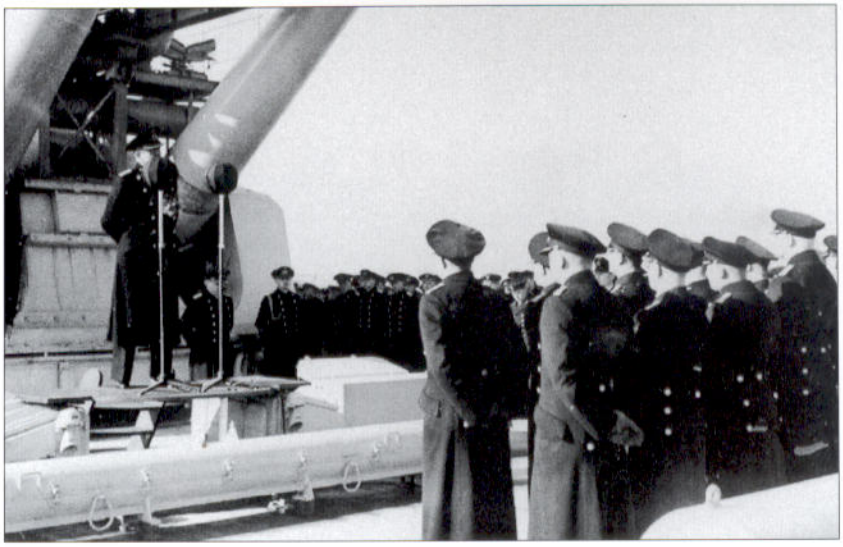
Scharnhorst's final successful sortie began on 6 September 1943 when, in company with *Tirpitz* and nine destroyers, she took part in the bombardment of Allied installations on Spitzbergen.

Scharnhorst had until then been a highly popular ship with her crew. Through four years of war, she had been involved in a few scrapes with the enemy, but had always come safely through and was considered a 'lucky' ship. Her luck was about to run out.

On 22 December 1943, German aircraft reported a convoy of enemy merchantmen making its way towards Murmansk. *Tirpitz* having been disabled by attacks from enemy midget submarines, *Scharnhorst* was the only major unit available to intercept this convoy and, having raised steam, she set sail on 25 December in consort with five destroyers.

A further view from the bow of *Scharnhorst* shows just how heavily iced this area became during severe winter weather, a problem exacerbated by her tendency to ship vast amounts of water over the fo'c'sle in heavy seas.





The *Scharnhorst*'s commanding officer, Kapitän zur See Hoffmann, addresses his ship's company on the quarterdeck. Those personnel visible here are officers and warrant officers.

Unknown to the Germans, two escort groups of British warships, including the battleship *Duke of York*, heavy cruiser *Norfolk*, the light cruisers *Belfast*, *Jamaica* and *Sheffield* as well as a number of destroyers, were providing cover for convoys in this area.

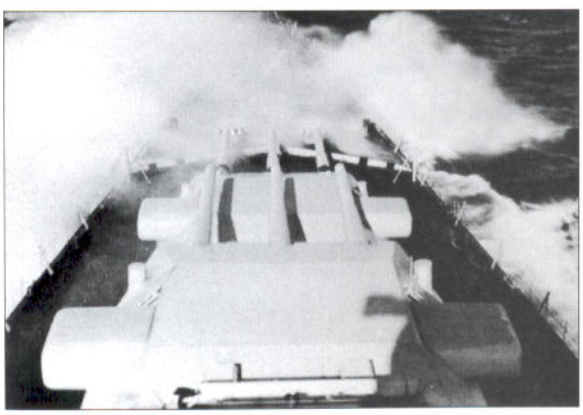
Due to extremely heavy seas, in which the German destroyers suffered badly, the lighter vessels were released to return to port, thus leaving the *Scharnhorst* alone and unescorted.

Weather conditions were appalling, and it was the British with their superior radar, who spotted the enemy first. *Scharnhorst* was engaged by the group comprising *Norfolk*, *Belfast* and *Sheffield* and quickly suffered a number of hits. Though none of them was particularly devastating, one did destroy her foretop radar set. *Sharnhorst* then turned and headed south towards Norway.

At just after 1615 hours on 26 December, *Scharnhorst* was detected on *Duke of York*'s radar. At 1648hrs, the British battleship opened fire, and scored a hit on *Scharnhorst*'s turret 'Anton'. A few moments later the British cruisers joined the action and began scoring hits on the German battleship. With her foretop radar out of action, *Scharnhorst* had been unaware of the enemy approaching and the sudden onslaught of gunfire came as a nasty surprise.

Forced to turn away and use the advantage of her superior speed, *Scharnhorst* pulled out of range of the accurate fire she was receiving from the British cruisers, but the 15-inch guns of *Duke of York* were still scoring significant hits. Turret 'Bruno' was also put out of action by damage to the fume extraction system, which meant that the air in the turret soon became unbreathable.

A view down towards the bow from *Scharnhorst*'s bridge area gives a good impression of just how 'wet' a ship she was. The constant flooding of waves over her fo'c'sle caused regular problems with the electrics of her forward turrets.



The end came swiftly after *Scharnhorst* suffered a hit on her boiler room, causing a fatal drop in speed. British destroyers soon caught up with her and attacked with torpedoes, scoring four hits on the German ship. The crippled warship now only had her stern turret 'Caesar' still functioning. With her speed now reduced by two thirds, *Scharnhorst* continued to return fire but at 1916hrs turret 'Caesar' was also put out of action, leaving *Scharnhorst* only her secondary armament. Just 14 minutes later, *Duke of York* ceased fire to allow the accompanying cruisers and destroyers to finish off the mortally wounded German with torpedoes. At 1945hrs, *Scharnhorst*'s magazines exploded and the battleship sank. Only 36 survivors, from a crew of 1,968, were pulled from the sea.

SCHARNHORST SPECIFICATIONS

Displacement	37,820 tonnes, loaded
Length	235.4m
Beam	30m
Propulsion	3 x Brown-Boveri turbines developing a total of 160,060hp. Though technically advanced, they were prone to breakdown due to insufficient development time for the design before being opera tionally installed.
Speed	32 knots
Endurance	7,100 nautical miles at optimum speed of 19 knots
Fuel Capacity	6,108 metric tons
Armament	9 x 28cm guns in three triple turrets, capable of firing projectiles weighing over 300 kilos to a maximum range of 42.5km at a rate of 3.5 rounds per minute per barrel. 8 x 15cm guns in four twin turrets, capable of firing 45.3 kilo projectiles to a maximum range of 23km at a rate of 8 rounds per minute per barrel. 4 x 15cm guns in single turrets, specification as above, but range of 22km due to slightly less maximum elevation. 14 x 10.5cm flak guns in twin turrets, firing a 15 kilo projectile to a maximum range of 17.7km at a rate of 18 rounds per minute per barrel. 16 x 3.7cm flak guns in twin turrets, firing projectiles weighing 0.75 kilos at a rate of 40 rounds per minute to a range of 8.5km. 22 x 2cm flak guns mounts in a mixture of single- and quadruple-barrel mounts, 120 rounds (single barrel) or 220 rounds (quadruple barrel) per minute to a range of 4.9km. Specifically, the quad 2cm mounts were located on the funnel platform and on small platforms on the aircraft catapult support frames. A temporary quad 2cm mount was also fitted atop turret 'Bruno' for the duration of *Unternehmen Cerberus*. 6 x 53.3cm torpedoes (never used operationally) 3 x Arado 196 floatplanes
Crew	1,968

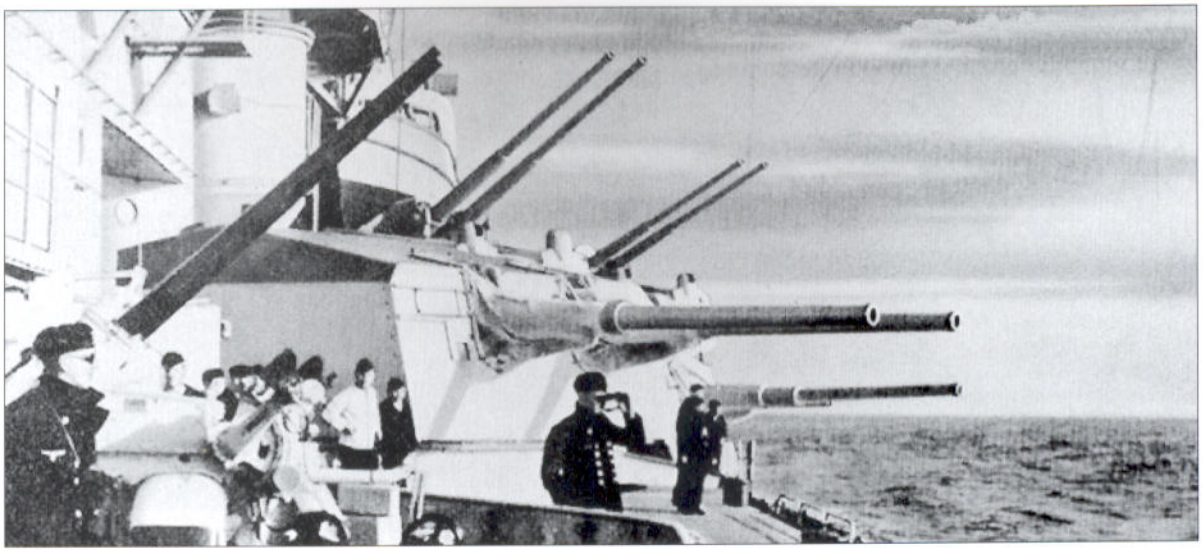
Ship's Commanders

January 1939 – September 1939	Kapitän zur See Otto Ciliax
September 1939 – April 1942	Kapitän zur See Kurt Hoffmann
April 1942 – October 1943	Kapitän zur See Friedrich Hüffmeier
October 1943 – December 1943	Kapitän zur See Fritz Hintze

Note: On 10 September 2000, the wreck of the *Scharnhorst* was discovered in 290 metres of water off the North Cape by survey vessels of the Norwegian Navy.

Schlachtschiff Gneisenau

Gneisenau, the first of the class to be laid down, was not launched until after her sister. At the launch ceremony on 8 December 1936, the christening was carried out by the widow of the commander of the cruiser SMS *Gneisenau* of the Kaiserliche Marine, lost along with SMS *Scharnhorst* during the Battle of the Falklands in December 1914. The ship was named for August Wilhelm Anton Graf Niedhardt von Gneisenau (1760–1831), a contemporary of Scharnhorst and chief of staff to FieldMarshall Blücher. Like Scharnhorst, Gneisenau was a great reformer who promoted social reform, abolishment of corporal



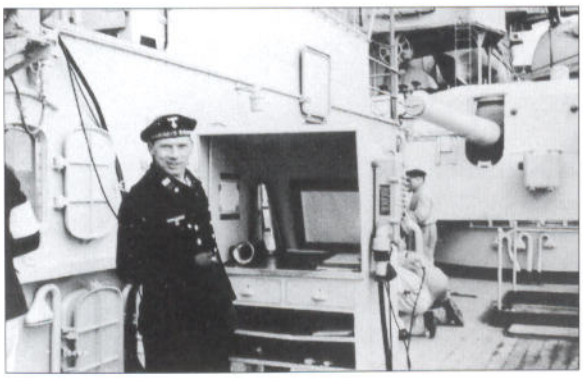
An excellent view of one of *Scharnhorst*'s secondary turrets, mounting 15cm guns. The guns shown at high elevation behind this turret are those of her main 10.5cm flak batteries. One of the ship's boats can be seen just above these flak guns.

punishment and promotion on merit within the Prussian Army. He died of cholera at the age of 71. It was particularly appropriate that Germany's two most modern warships were named for two contemporaries who did so much to improve and modernise the Prussian Army. Commissioned into the Navy in May 1938, *Gneisenau*'s first commander was Kapitän zur See Förste.

After taking on her crew, a large portion of which was drafted in from the light cruiser *Karlsruhe*, the new battleship set sail on her sea trials. *Gneisenau* was based at Kiel. As had happened with *Scharnhorst*, it quickly became clear when on her trials that *Gneisenau* had a tendency to ship significant quantities of water over her fo'c'sle in even moderate seas. As a result, in January 1939, like her sister, she had her stem remodelled, giving her the so-called 'Atlantic' bow. As with her sister, it was found that this modification made little difference and the problem was never fully solved. A raked funnel cap was also fitted. Unlike *Scharnhorst*, however, *Gneisenau*'s mainmast remained in its original place, abaft the funnel, and this became the most significant visual difference between the two almost identical sisters.

Just one week after the outbreak of war in September 1939, *Gneisenau* moved into the Baltic, where she spent some time on extensive training exercises.

Another detail view taken on *Scharnhorst*'s starboard side main deck looking forward towards one of her secondary armament turrets.



A brief sortie along with *Scharnhorst* and a number of destroyers followed in October, but this was uneventful. On 21 November, *Gneisenau* sailed with *Scharnhorst*, the cruisers *Leipzig* and *Köln*, and the destroyers *Bernd von Arnim*, *Erich Giese* and *Karl Galster* on the sortie towards the Faroes in which the armed merchant cruiser *Rawalpindi* was sunk.

Like *Scharnhorst*, the *Gneisenau* also suffered significant damage in the heavy seas and, on return from this sortie, went into the dockyard at Kiel where she spent the second half of December.

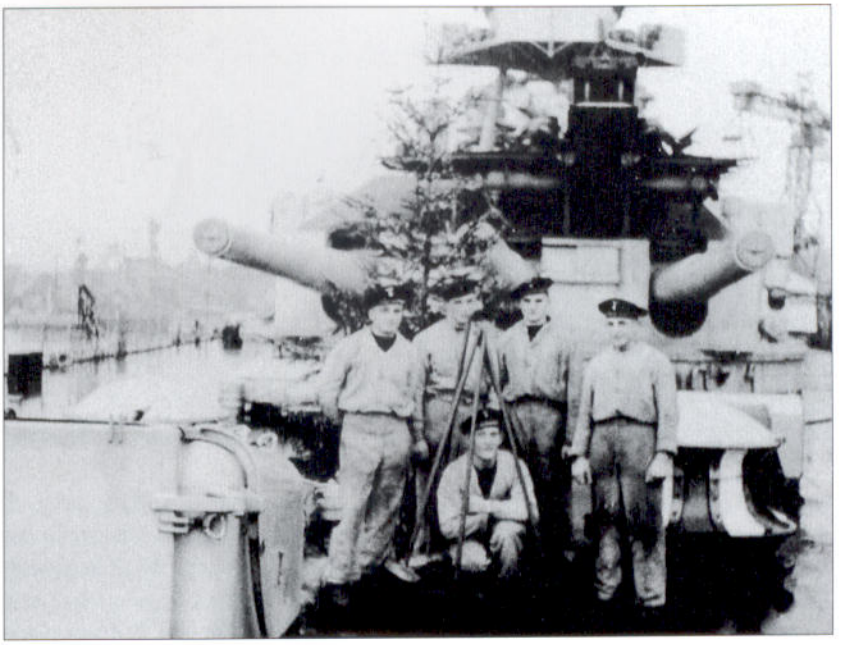
***Scharnhorst* at her moorings in Wilhelmshaven. With the Baltic port frozen over in winter, her crew was able to make most of the way to the ship on foot. Old battleships like *Schleswig-Holstein* and *Schlesien* were often used as ice-breakers to allow other ships to make their way through to open water.**

In the early part of 1940, *Gneisenau* underwent further training and trails in the Baltic with her sister. Having suffered some damage when she was trapped in thick ice at Kieler Förde, *Gneisenau* was briefly taken into dry dock again for repairs.

In mid-February *Gneisenau* sortied as far as the Shetland Islands with her sister, the *Admiral Hipper* and a small force of destroyers, but once again the voyage was uneventful and within two days the German battleship was back in its home port. Once again, she was taken into dry dock for minor modifications, most significantly the removal of the aircraft catapult from the roof of turret 'Caesar' along with its accompanying crane.

On 7 April 1940 *Gneisenau* set off on her next sortie, in consort with her sister, together with the *Admiral Hipper* and a force of 14 destroyers. As previously described, this force, while providing flank cover for the German invasion force heading for Norway, encountered the British battlecruiser HMS *Renown*. In the brief exchange of fire that followed, *Gneisenau* was hit in the foretop, on turret 'Anton', and by the port main anti-aircraft battery. Serious damage was also caused by flooding due to substantial quantities of sea water being shipped in the rough seas. On returning to Germany she was again taken into dock for repairs.

In early May *Gneisenau* sailed for the Baltic, but within just two hours of leaving Wilhelmshaven, she hit a mine. She was in action once again, however, during the following month, departing on 4 June, again in company with *Scharnhorst* and the *Admiral Hipper*. The sortie, designed to relieve the pressure on German forces in Norway, resulted in the Germans intercepting a small British force returning to the UK, sinking the carrier HMS *Glorious* and the destroyers HMS *Ardent* and HMS *Acasta*. Following this action, *Gneisenau* put briefly into Trondheim but shortly after leaving, on 20 June, she was torpedoed by the British submarine HMS *Clyde*. Suffering a hit on her starboard bow, she was forced to return to Trondheim for temporary repairs. Although the hole torn by the torpedo was substantial, reputedly large enough to allow a small boat to pass straight through the ship from one side to the other, the effects of the damage were restricted to the fo'c'sle area itself and the huge hole was quickly plated over.



Crewmen in working rig pose for a photograph on *Scharnhorst*'s quarterdeck. The catapult on turret 'Caesar' can just be discerned, as can the darker red-coloured paint on the turret roof. Given the tree visible behind these crewmen, it is assumed that this photo was taken around Christmas time.

On 26 July *Gneisenau* set sail for home, with a sizeable escort, only to find herself the target of yet another torpedoing attempt, this time by HMS *Thames*. Fortunately for *Gneisenau*, the torpedoes missed her, but regrettably for her escorts, the torpedo boat *Luchs* was hit and sank.

Gneisenau reached Kiel safely on 30 July, and spent the remainder of the year undergoing repairs. On 28 December, she set sail, once again with *Scharnhorst*, on a raiding sortie but ran into seriously bad weather and suffered significant storm damage, forcing her and her sister to return to port.

On 22 January 1941, after a further brief spell in dock undergoing minor improvements, the sisters put to sea again. The sortie was a great success for *Gneisenau*, which claimed 11 enemy ships sunk and three captured, this representing over 66,000 tonnes. On returning from this sortie, *Gneisenau* put into Brest on 22 March 1941.

Unfortunately, while waiting to enter dry dock for an overhaul of her engines, she was hit by a torpedo dropped by a British aircraft and suffered serious damage. No sooner had she been taken into dry dock than she was attacked once again by enemy aircraft and suffered four bomb hits, one of which failed to explode. The three that did explode

With several of her crew members in their summer whites on the fo'c'sle, *Gneisenau* ploughs through the calm waters of the Baltic.

Gneisenau **is seen here in her initial form, with straight stem and with the catapult still fitted over turret 'Caesar'. Given the flat calm seas and the sizeable bow wave (compared to the previous photograph), it seems likely that this shows her at high speed during her trials.**

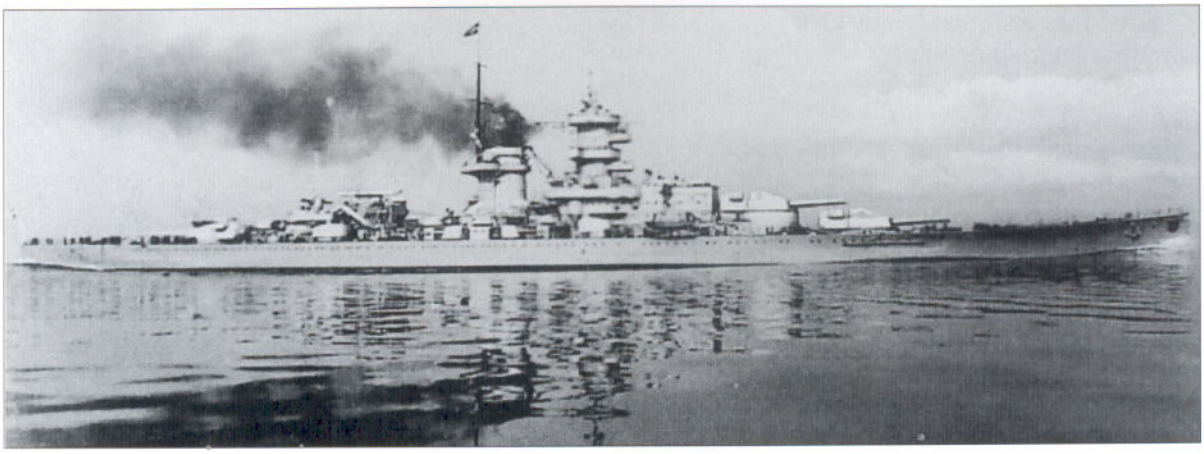
caused 78 deaths, over 80 wounded and substantial damage. All non-essential crew were thereafter removed and housed in barracks on shore. Further repairs were necessitated, resulting in *Gneisenau* remaining out of action until January 1942.

By this point it had become clear that remaining in the French ports was not a viable option for *Scharnhorst* and *Gneisenau,* and on 11 February, in company with the heavy cruiser *Prinz Eugen* and a flotilla of smaller craft as escorts, the two sisters broke out and ran for German waters. Although the operation, codenamed Cerberus, was a massive propaganda success for the Germans, bringing a sizeable flotilla of warships through the Channel under the very noses of the British, both *Scharnhorst* and *Gneisenau* ran into mines. In *Gneisenau*'s case, the damage was slight and she was able to continue on into Brunsbüttel harbour along with *Prinz Eugen.*

On 13 February, *Gneisenau* moved to Kiel where she underwent repairs at the Deutsche Werke yard. Unfortunately, and contrary to regulations, *Gneisenau* was taken into dry dock before her ammunition stocks were unloaded. On the night of 26 February during a heavy air raid, one solitary bomb hit her fo'c'sle and exploded after penetrating the armoured deck. Munitions stored in turret 'Anton' were detonated and the resultant explosion blew the massive turret from its bearings and over 100 crewmen were killed.

The massive repairs required were not possible at Kiel, so *Gneisenau* was moved, under her own power, to Gotenhafen, arriving on 4 April. At this point it was decided that as such major repairs were required, the opportunity would be taken to rebuild her, putting into effect intended improvements and modernisation, the principal effect of which was the removal of her triple 28cm gun turrets and their replacement with twin 38cm gun turrets as carried on *Bismarck* and *Tirpitz.* Accordingly, *Gneisenau* was decommissioned on 1 July 1942 and work began with the removal of her damaged bow and unshipping of her turrets, which were subsequently to be used as shore batteries. One of her turrets, mounted on a concrete blockhouse at Bergen, is still intact and has been fully restored.

On January 1943 Hitler ordered the cessation of all conversion work. The remainder of *Gneisenau*'s guns were thereafter removed and the ship used as a floating storehouse and even as a floating air-raid shelter.



***Gneisenau* as depicted on a period propaganda photograph. This shows her graceful lines to good advantage.**

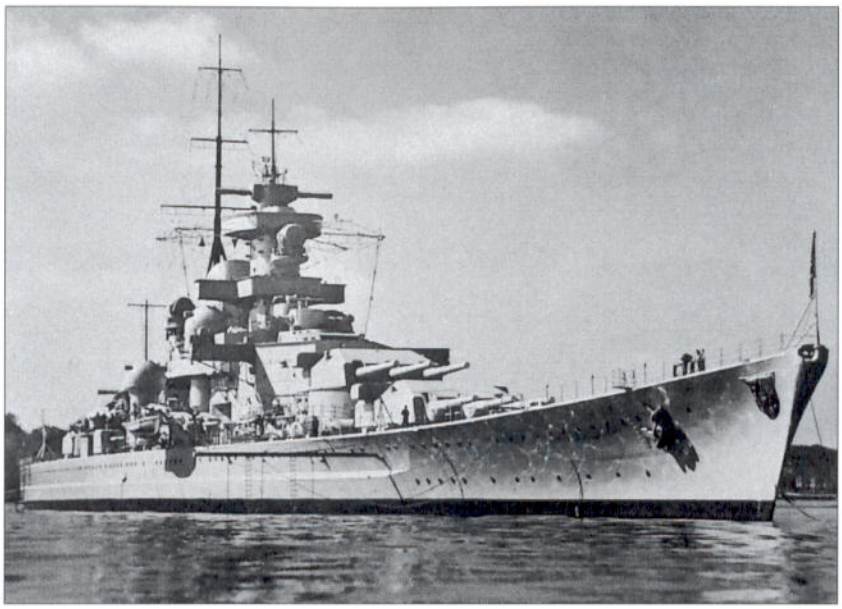
This once-magnificent ship met an ignominious end on 27 March 1945 when she was towed out into the entrance to Gotenhafen harbour as the Russians drew near, and sunk as a blockship. The wreck lay there until 1951 when the remains were raised and finally scrapped.

***GNEISENAU* SPECIFICATIONS**	
Displacement	37,900 tons, loaded
Length	234.9m
Beam	30m
Propulsion	3 x Deschimag turbines developing a total of 154,000hp
Speed	31 knots
Endurance	6,200 nautical miles at optimum speed of 19 knots
Fuel Capacity	5,360 metric tons
Armament	9 x 28cm guns in three triple turrets, capable of firing projectiles weighing over 300 kilos to a maximum range of 42.5km at a rate of 3.5 rounds per minute per barrel. 8 x 15cm guns in four twin turrets, capable of firing 45.3-kilo projectiles to a maximum range of 23km at a rate of 8 rounds per minute per barrel. 4 x 15cm guns in single turrets, specification as above, but range of 22km due to slightly less maximum elevation. 14 x 10.5cm flak guns in twin turrets, firing a 15-kilo projectile to a maximum range of 17.7km at a rate of 18 rounds per minute per barrel. 16 x 3.7cm flak guns in twin turrets, firing projectiles weighing 0.75 kilo at a rate of 40 rounds per minute to a range of 8.5km. 22 x 2cm flak guns mounts in a mixture of single- and quadruple-barrel mounts, 120 rounds (single barrel) or 220 rounds (quadruple barrel) per minute to a range of 4.9km. 6 x 53.3cm torpedoes (never used operationally) 3 x Arado 196 floatplanes
Crew	1,669

Ship's Commanders

May 1938 – November 1939	Kapitän zur See Erich Förste
November 1939 – August 1940	Kapitän zur See Harald Netzbandt
August 1940 – April 1942	Kapitän zur See Otto Fein
February 1942 – May 1942	Kapitän zur See Rudolf Peters
May 1942 – July 1942	Kapitän zur See Wolfgang Kähler

The *Gneisenau* was a beautiful ship, aesthetically very pleasing, and very popular with her crew, but fundamentally flawed. She was as big as a battleship, but, in comparison with the capital ships of Germany's principal opponents, was under gunned. She also had poor sea-keeping qualities, suffering badly in heavy seas. Her powerplant, consisting of advanced steam turbines that were the most powerful ever fitted to a German warship, suffered from being rushed into service before sufficient testing, resulting in numerous breakdowns of varying degrees of seriousness.



This view shows *Gneisenau* after her refit, now sporting the raked 'Atlantic' bow, which did little to cure her tendency to ship considerable amounts of water over her fo'c'sle at speed or in heavy seas. The angled funnel cap can just be seen by the base of her mainmast. That this is a pre-war photograph is confirmed by the presence of the ship's crest on the bow. It was removed on the outbreak of war.

In terms of armour protection, *Gneisenau* boasted 35cm-thick side armour, capable of withstanding a hit from a 38-cm (15-inch) shell. The main deck consisted of 5-cm thick armour plate, rather modest, but reinforced two decks below by a further armoured deck 9.5-cm thick. This, it was calculated, would contain the destructive effect of any projectile exploding after penetrating the main deck above. These specifications may have been acceptable at the time she was built, but, as the war progressed and the penetrating power of Allied bombs increased, it was to prove inadequate. Protection from torpedoes, on the other hand, was excellent, with a 4.5-cm thick armoured torpedo bulkhead 4.5m inboard from the outer hull.

Colour Schemes

Both *Scharnhorst* and *Gneisenau*, as completed, were finished in a pale grey colour scheme. After the outbreak of war, however, a number of disruptive camouflage schemes were utilised, which varied considerably in their complexity.

During the autumn of 1940, both *Scharnhorst* and *Gneisenau* carried broad black and white bands painted diagonally across the hullside and continuing up over the superstructure. Extremely dark grey paint was added to the forward and aft portions of the hull, to give the impression of a smaller ship, and to complement this effect, false white bow and stern waves were added at the extremities of the pale grey portions of the hull.

For *Unternehmen Cerberus* in February 1942, *Scharnhorst* carried an interesting scheme in which her armoured belt and a smaller projection forward and aft of this was painted in a darker grey than the remainder of the hull, and her turret sides and upper superstructure painted with a darker grey mottle over the base pale grey.

In mid-1943 *Scharnhorst* had her hull and upperworks painted in a darker grey than during the early part of the war, but in a reversal of

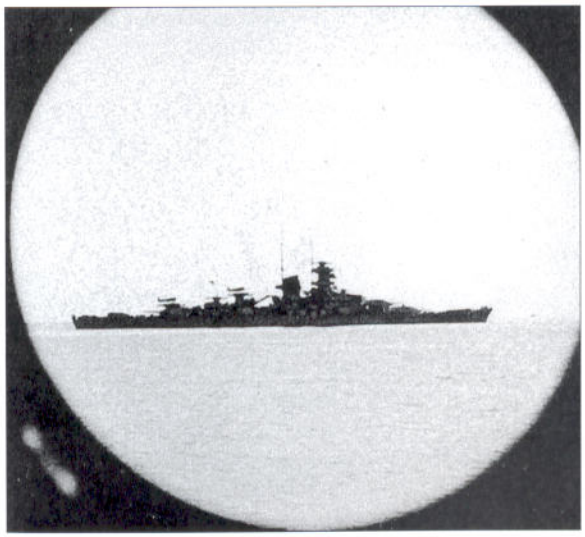
early disruptive schemes, the forward and aft extremities of the hull were painted in a very pale grey, again intended to give the impression of a smaller ship.

In order to avoid inadvertent attack from friendly aircraft, recognition colours were often carried on the turret roofs during certain sorties. For *Unternehmen Cerberus*, the roofs of the main turrets and the twin 15cm turrets were painted blue. In contrast, during Operation Berlin in January 1941 these same turret roofs were painted yellow.

THE *BISMARCK* CLASS

One of the most famous warships of all time, the *Bismarck* was laid down at the shipyard of Blohm & Voss in Hamburg on 1 July 1936. She was a direct result of the Anglo-German Naval Agreement of June 1935 that finally lifted the restrictions of the Treaty of Versailles on German shipbuilding. It was agreed, amongst other things, that Germany could build a surface fleet of up to 35 per cent of the size of Great Britain's. This meant a tonnage allowance of 184,000 tonnes available for battleship construction, equating to five ships of some 35,000 tonnes each. This was subsequently increased to 45,000 tonnes. Preliminary work soon began on the design of a large battleship class, broadly equivalent to the 15-inch-gun battleships of the Royal Navy.

The new class of ship was essentially an enlarged, improved version of the 'D'/'E' design that resulted in *Scharnhorst* and *Gneisenau*, lengthened to accommodate a fourth turret. These new ships were to have fully 70 per cent of the length of their waterline protected behind a strong armoured belt and the hull divided into 22 watertight compartments to ease the control of flood or fire damage. In fact, this new class featured an armoured belt 32cm thick, as compared to 35cm with the 'D'/'E' class, but this was backed up by an internal sloped armoured deck within the hull, some 12cm maximum thickness compared with 11 cm maximum on the 'D'/'E' class. This was certainly sufficient to defeat any known enemy armament at the time the new ships were conceived.



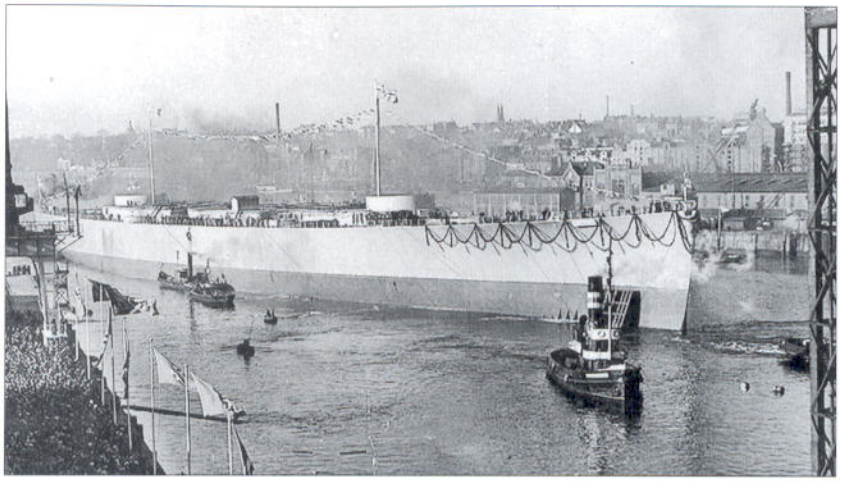
***Gneisenau*, framed by one of the portholes on her sister, the *Scharnhorst*. Though this shows her in post-refit form, she still sports the catapult on turret 'Caesar'. The tiny silhouettes of her Arado 196 seaplanes can be clearly seen.**

Schlachtschiff Bismarck

The *Bismarck* was launched at the Blohm & Voss yard in Hamburg on 14 February 1939. In the ceremony, attended by Adolf Hitler, the christening was performed by Dorothea von Löwenfeld, granddaughter of the 'Iron Chancellor' himself. *Bismarck* was named for Otto *Fürst* von Bismarck (1819–98), architect of the First German Reich following the defeat of France in the Franco-Prussian War of 1870–71 and the subsequent crowning of Wilhelm I, King of Prussia, as Kaiser or Emperor of a united Germany. Bismarck became minister-president of Prussia and Reichs-kanzler of Germany.

As launched, *Bismarck* featured a straight stem, but whilst she was still being fitted out, the opportunity was taken to provide her with a raked

'Atlantic' bow. On completion of her fitting out she was formally commissioned into the Kriegsmarine on 24 August 1940, under the command of Kapitän zur See Ernst Lindemann. On 15 September, as she prepared to depart Hamburg for the Baltic and an extensive period of trials and training, *Bismarck* had cause to use some of her armament in anger for the first time. The occasion was a British air raid on Hamburg, and as the searchlights probed the skies for enemy aircraft, *Bismarck*'s flak guns joined in with the shore-based anti-aircraft artillery but there is no record of her guns scoring any hits. From Hamburg, *Bismarck* moved first to Kiel, and then on to Gotenhafen in the Baltic. Here, in these relatively safe waters, *Bismarck* was put through her paces. Speed, manoeuvrability, emergency drills and gunnery training proved highly successful, the ship passing all tests with flying colours. In early December, the ship returned to Blohm & Voss in Hamburg for minor final fitting-out jobs to be completed. It had been intended that she return to the Baltic for further training exercises, but passage through the Kiel Canal was impossible due to a sunken ship whose raising was being made difficult by severe weather conditions.



***Bismarck*'s hull slides onto the waters at the Blohm & Voss yard in Hamburg on 14 February 1939. She has the original straight stem that was replaced by an 'Atlantic' bow during her fitting out. Only the first level of superstructure has been completed along with the raised barbettes for turrets 'Bruno' and 'Caesar'.**

Eventually, in mid-March, *Bismarck* was once again able to make her way to the Baltic, and for the next two months carried out further training exercises and testing of equipment. Finally, in May 1941, she was declared ready for combat service. During this period, *Bismarck* was given a disruptive camouflage paint scheme consisting of bold black and white angular stripes across her hull and upperworks as well as false bow and stern waves intended to make her look smaller.

Previously, plans had been made by naval high command to put together a powerful force consisting of the battleships *Bismarck*, *Tirpitz*, *Scharnhorst* and *Gneisenau*. As *Scharnhorst* and *Gneisenau* had already carried out a successful raid against British shipping, one can only imagine the havoc that could have been created, and the sheer amount of Royal Navy resources that would have been required to hunt down this German force. Unfortunately for Germany, *Tirpitz* was not yet ready for combat service and *Scharnhorst* was undergoing an extensive overhaul of her engines. It was thus decided that *Bismarck* would sortie along with *Gneisenau* and the heavy cruiser *Prinz Eugen*. *Bismarck*'s task would be to engage any warships escorting convoys that might be intercepted, and draw them off to allow her consorts to attack the merchantmen.

The plans were changed once again, however, when *Gneisenau* was damaged by an RAF bombing raid on the port of Brest, where she was docked. Thus, the forthcoming sortie, codenamed *Rheinübung*, was to be carried out only by *Bismarck* and *Prinz Eugen*. Under the command of Admiral Günther Lütjens, who flew his flag on *Bismarck*, the German

force would attempt to take the northern route, across the North Sea and down through the Denmark Straits into the Atlantic, undetected if possible, and then prey on convoys of merchant ships bringing essential supplies across the Atlantic from Nova Scotia in Canada.

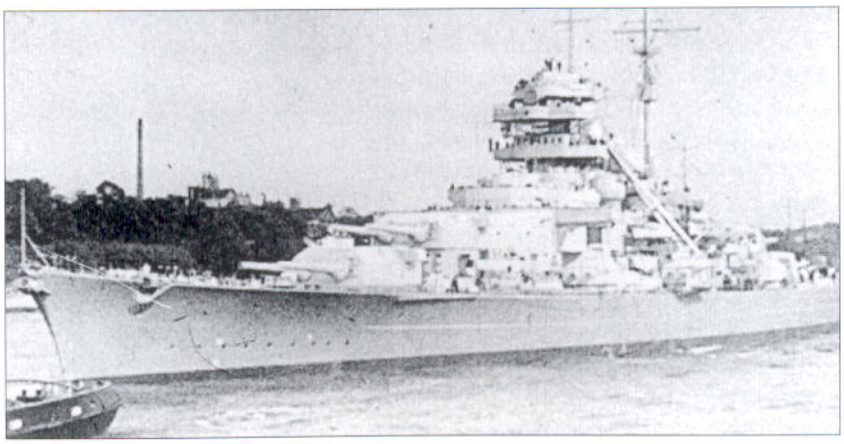
On 25 April 1941 *Bismarck* and *Prinz Eugen* were ordered to sail, escorted by a number of destroyers. Yet more delays to the fateful mission were experienced after *Prinz Eugen* was damaged by an exploding mine. Although there was some hope that the mission might now be delayed until *Scharnhorst* and *Tirpitz* were ready for action, the Commander-in-Chief Navy, Grossadmiral Raeder, decided that the mission must proceed as soon as *Prinz Eugen* was once again ready for action.

On 1 May Hitler paid a formal visit to *Bismarck*, along with Generalfeldmarschall Keitel and Grossadmiral Raeder. *Bismarck* sailed from Gotenhafen on 18 May and, after a brief refuelling stop, proceeded through the Kattegat and Skagerrak and on to Grimstadfjord near Bergen in Norway where she dropped anchor. At this point the distinctive black and white angular camouflage pattern which had been applied to her hull and upperworks was painted out. Only the false wave some way back from her bow remained. At around the same time, *Prinz Eugen* had arrived in Norway, anchoring at Kalvanes Bay, a little further north, where she topped up her fuel bunkers.

Unfortunately for the Germans, who had hoped to make their breakout into the Atlantic undetected, the arrival of the German ships in Norway was immediately reported to the British by members of the Norwegian underground movement. Photographs subsequently taken by RAF photo-reconnaissance aircraft confirmed *Bismarck*'s identity.

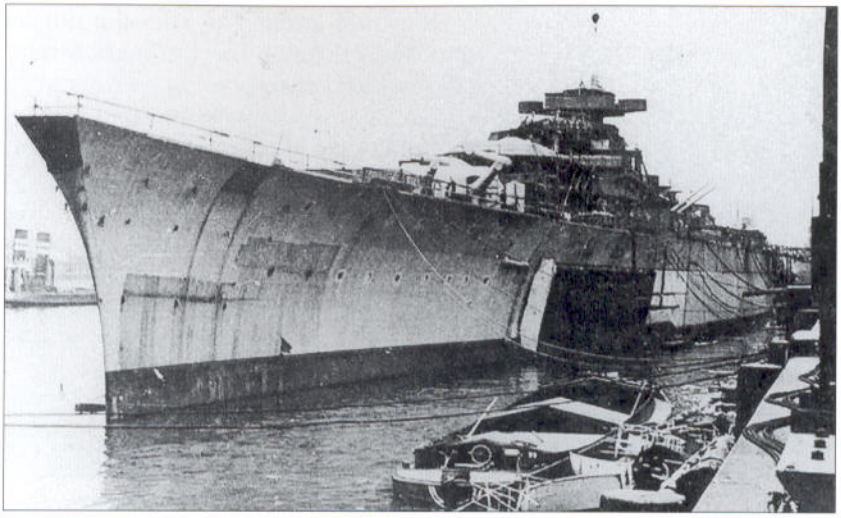
On 21 May, *Bismarck* set sail and rendezvoused with *Prinz Eugen* at Kalvanes Bay. Escorted by destroyers, the two sailed northwards. At the latitude of Trondheim the destroyer screen departed, leaving *Bismarck* and *Prinz Eugen* to continue steaming northwards, before turning west and skirting around the north of Iceland. Late on 23 May the German ships began negotiating the minefields that obstructed the Denmark Straits between the west coast of Iceland and the eastern limit of the ice fields off Greenland's east coast. It was here, on the evening of the 23rd, that contact was made with the British heavy cruiser *Suffolk*. Having spotted the German ships, *Suffolk* began to track them and was joined shortly afterwards by her sister, the *Norfolk*, alerted by signals from *Suffolk*. *Bismarck* opened fire, forcing the British cruisers to withdraw. After a brief attempt to pursuer her stalkers, *Bismarck* resumed her course.

The German force, now aware that they had been detected, expected to face enemy reinforcements at any time and indeed, just before 0600hrs on the



The *Bismarck* shortly after her completion and commissioning, immaculate in her fresh light grey paintwork. Note that the main fire control rangefinder on her foretop has not yet been fitted.

following morning, the mastheads of enemy ships were spotted on *Bismarck*'s port beam. The unwelcome arrivals were the battlecruiser *Hood* and the battleship *Prince of Wales*. The British opened fire almost immediately. Two minutes later, the German ships responded. Both concentrated their fire upon the *Hood*, whilst the British battlecruiser, confused by the similarity in design of the German ships, fired at the *Prinz Eugen*. The *Prince of Wales* correctly judged the identity of each of the German ships and fired on *Bismarck*. Within two minutes of opening fire, *Bismarck*'s observers noted a massive fire on the *Hood* just by her aft mast caused by hits from *Prinz Eugen*. Just four minutes after this, a salvo from *Bismarck* penetrated *Hood*'s decks and ignited her magazine. In a massive explosion, the British battlecruiser broke her back. Within minutes the two halves of the 48,000-ton warship had sunk, leaving but three survivors from a crew of 1421. With the gunfire of both German ships now directed against her, and having suffered a number of hits, *Prince of Wales* withdrew under cover of a smokescreen.



***Bismarck* during fitting out. The straight stem originally fitted has already been replaced by the 'Atlantic' bow.**

Bismarck, however, had also suffered a number of hits. One shell from *Prince of Wales* had ripped a hole right through the ship from port to starboard, allowing over 2,000 tonnes of water to be shipped. Another hit caused significant flooding in one of the boiler rooms. More significantly, *Bismarck* was now suffering from an oil leak, which would make it much easier for the enemy to find and track her.

Admiral Lütjens at this time decided that *Bismarck* would make for St Nazaire whilst *Prinz Eugen* continued into the Atlantic to hunt enemy merchant ships. Accordingly, at just after 1800hrs on 24 May, *Bismarck* turned to starboard, opening fire on the British ships still shadowing her, whilst *Prinz Eugen* turned to port and into the covering curtain of a rain squall, allowing her to escape.

The net began to close around *Bismarck* and at around 2330hrs, several aircraft appeared off her port bow. These were *Swordfish*, torpedo-carrying biplanes from the aircraft carrier HMS *Victorious*. Despite zigzagging at speed, *Bismarck* was unable to avoid all the torpedoes and one struck her on her starboard side, though it appeared to have struck the armoured belt and did little damage.

Shortly after this attack, *Prince of Wales* came within range once again and fired two salvoes from her main armament. *Bismarck* immediately responded, but neither scored any hits and the British battleships withdrew once again.

The British, now eager to avenge the loss of the *Hood*, reassigned every available heavy unit to the pursuit of the German battleship, even to the extent of stripping convoys of their escorting battleships. Before

A: *Schleswig-Holstein* Class

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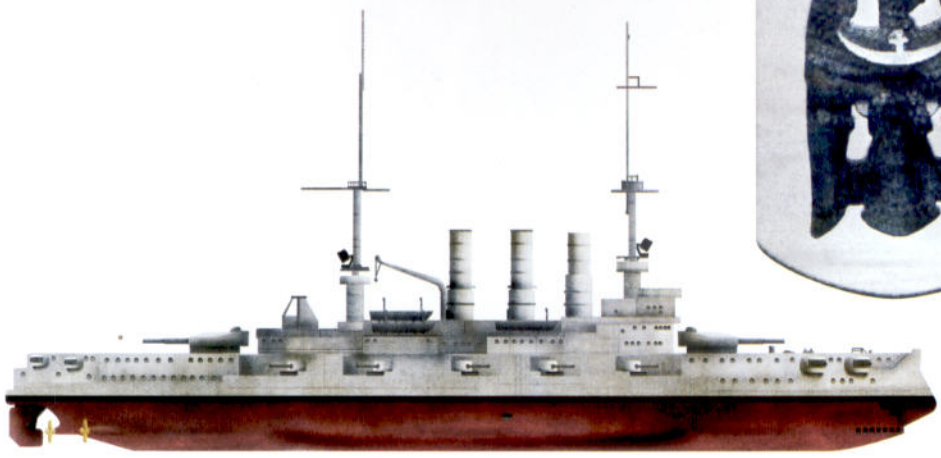

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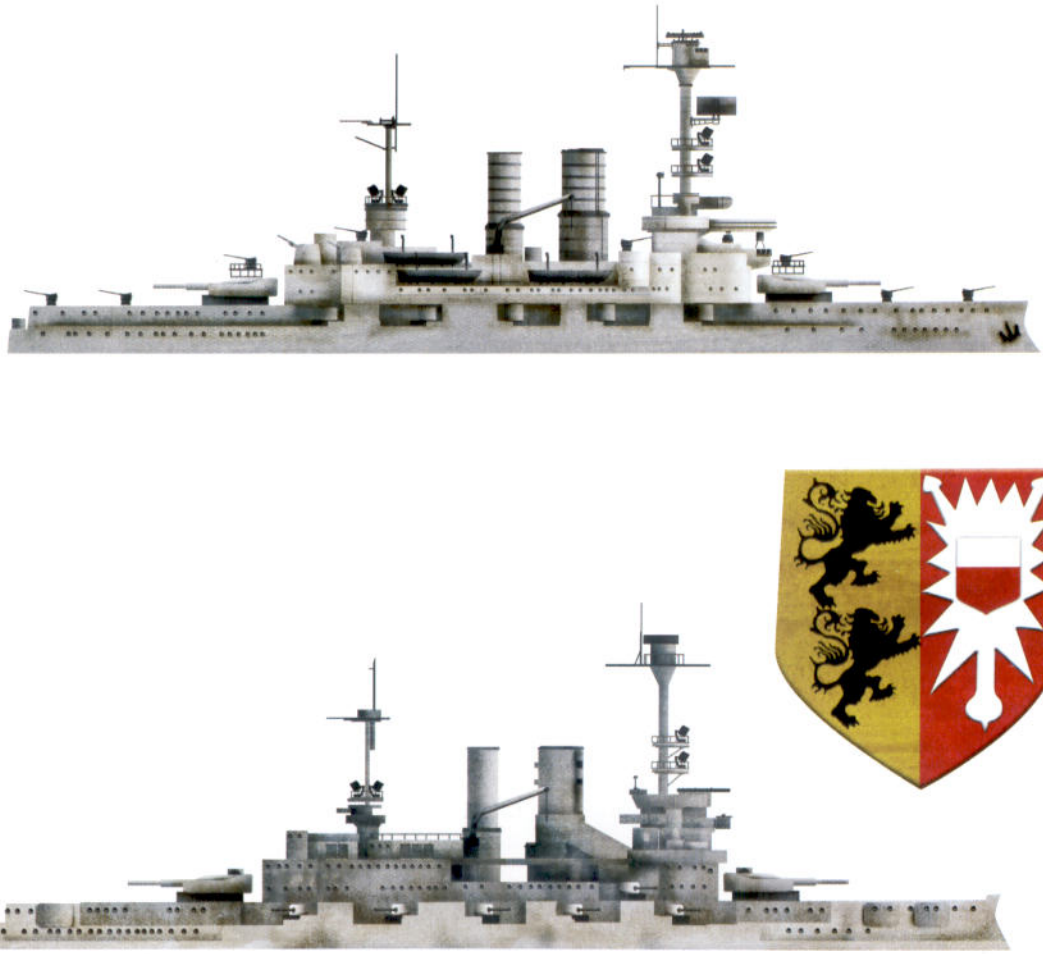

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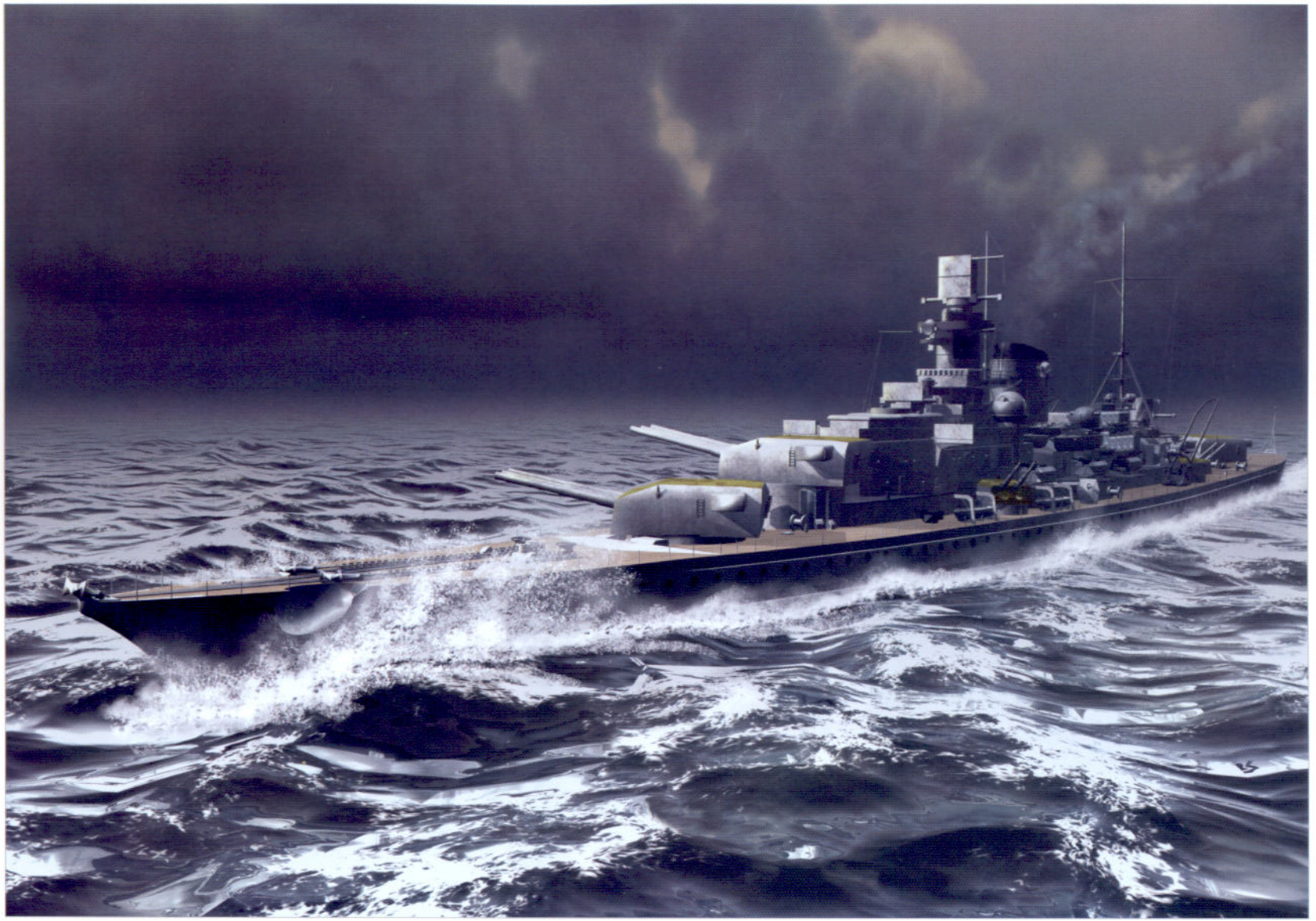
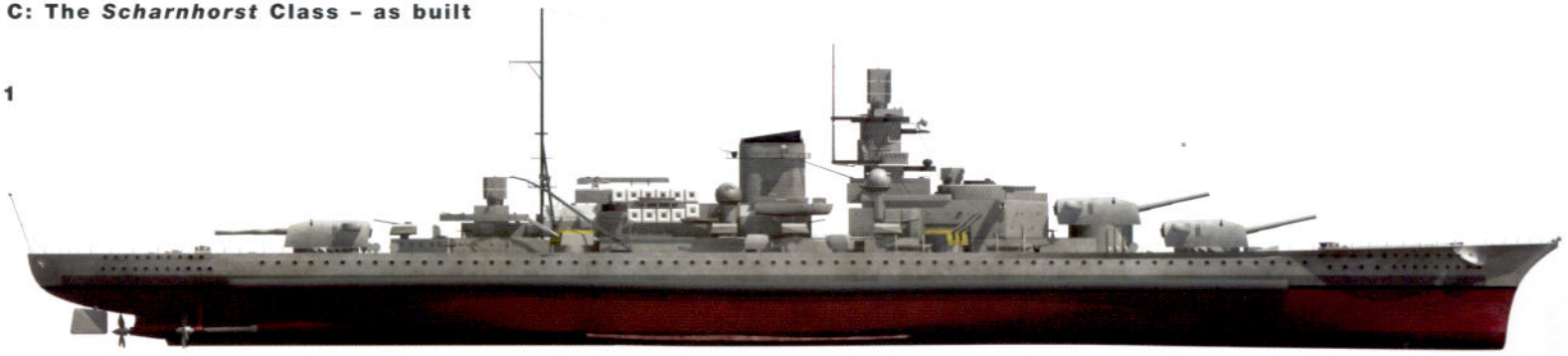


B: *Scharnhorst* in action

C: The *Scharnhorst* Class – as built

1



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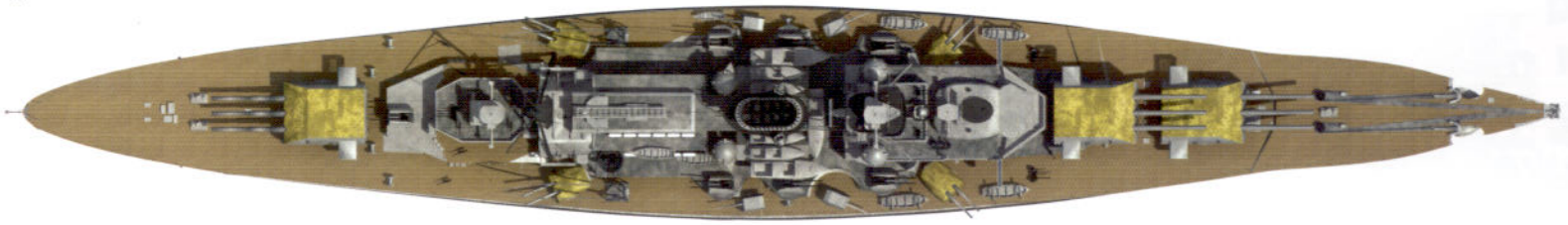

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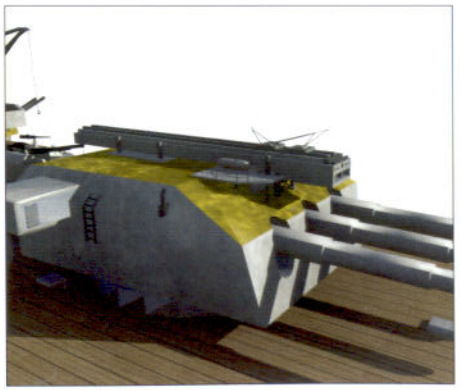

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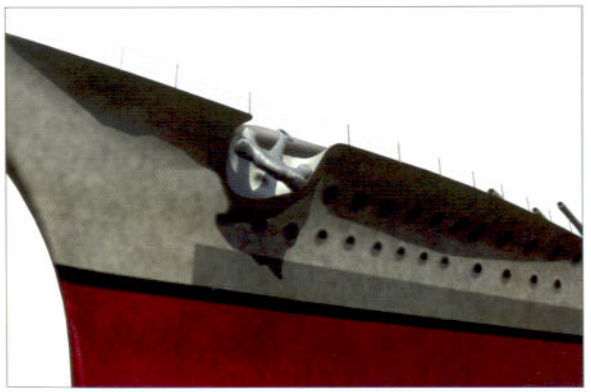
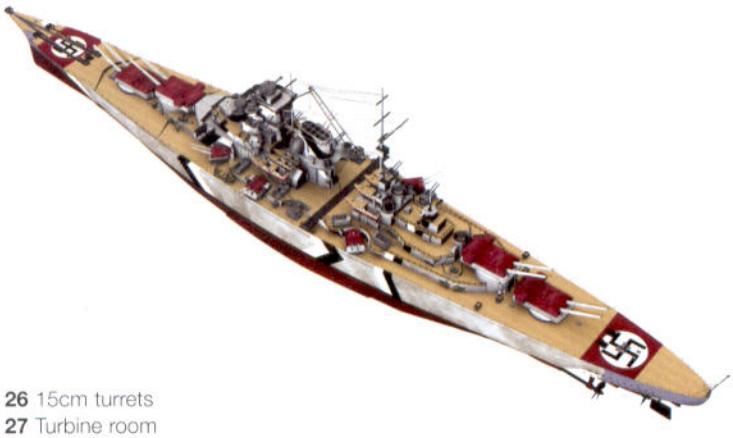
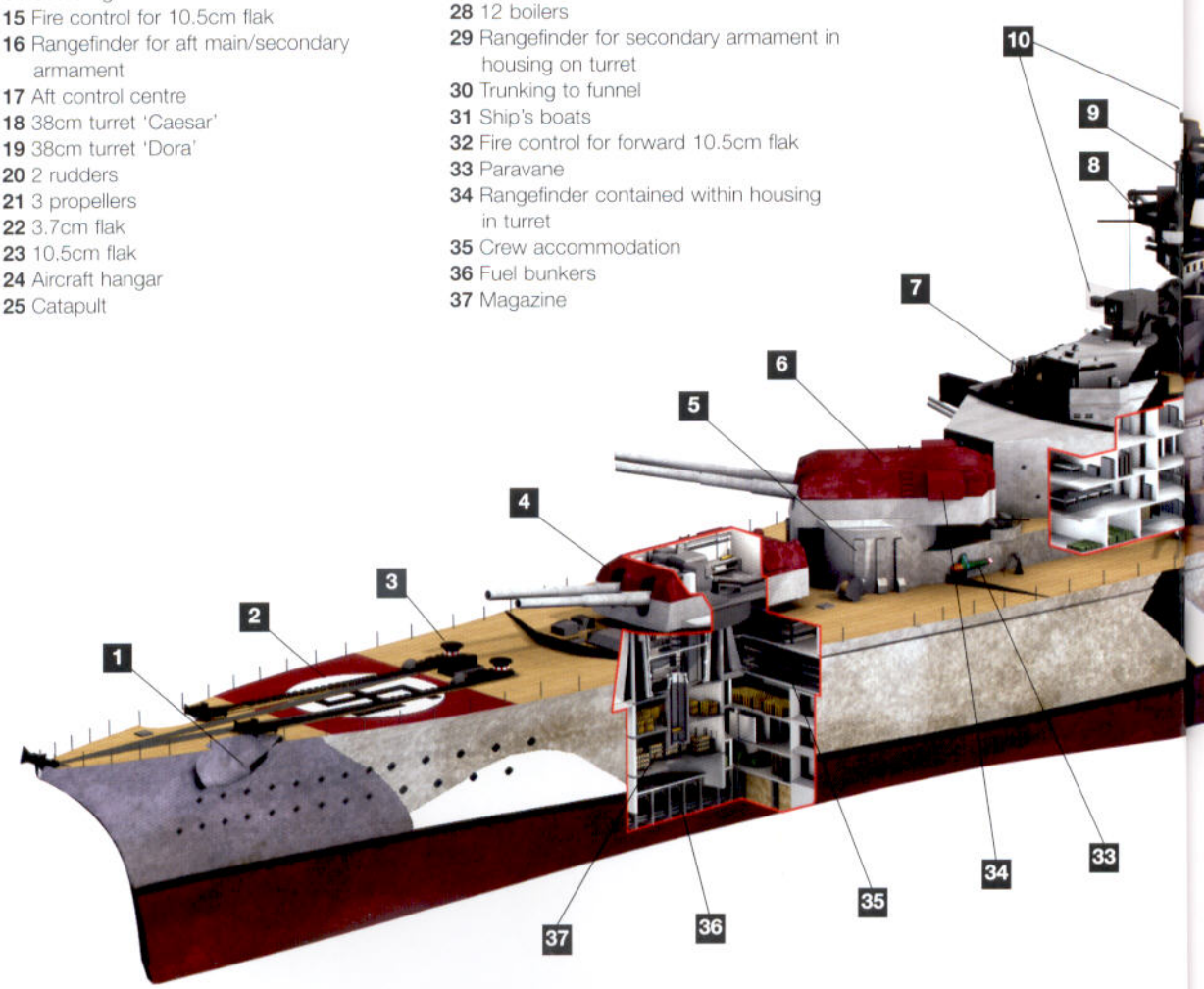


D: CUTAWAY VIEW – *BISMARCK*-CLASS BATTLESHIP

KEY

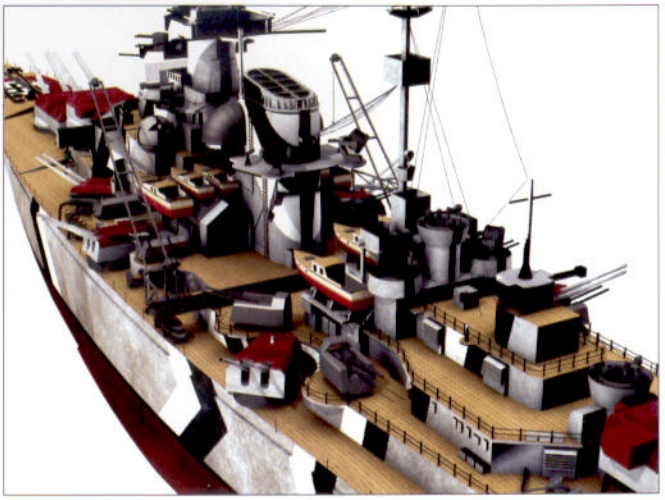
1 Anchor cluse
2 Aerial recognition mark
3 Capstan
4 38cm turret 'Anton'
5 Ventilation trunking
6 38cm turret 'Bruno'
7 Forward control centre
8 Bridge
9 Foretop
10 Rangefinders for forward main/secondary armament
11 Searchlight (covered)
12 Foremast
13 Mainmast
14 Searchlight
15 Fire control for 10.5cm flak
16 Rangefinder for aft main/secondary armament
17 Aft control centre
18 38cm turret 'Caesar'
19 38cm turret 'Dora'
20 2 rudders
21 3 propellers
22 3.7cm flak
23 10.5cm flak
24 Aircraft hangar
25 Catapult
26 15cm turrets
27 Turbine room
28 12 boilers
29 Rangefinder for secondary armament in housing on turret
30 Trunking to funnel
31 Ship's boats
32 Fire control for forward 10.5cm flak
33 Paravane
34 Rangefinder contained within housing in turret
35 Crew accommodation
36 Fuel bunkers
37 Magazine

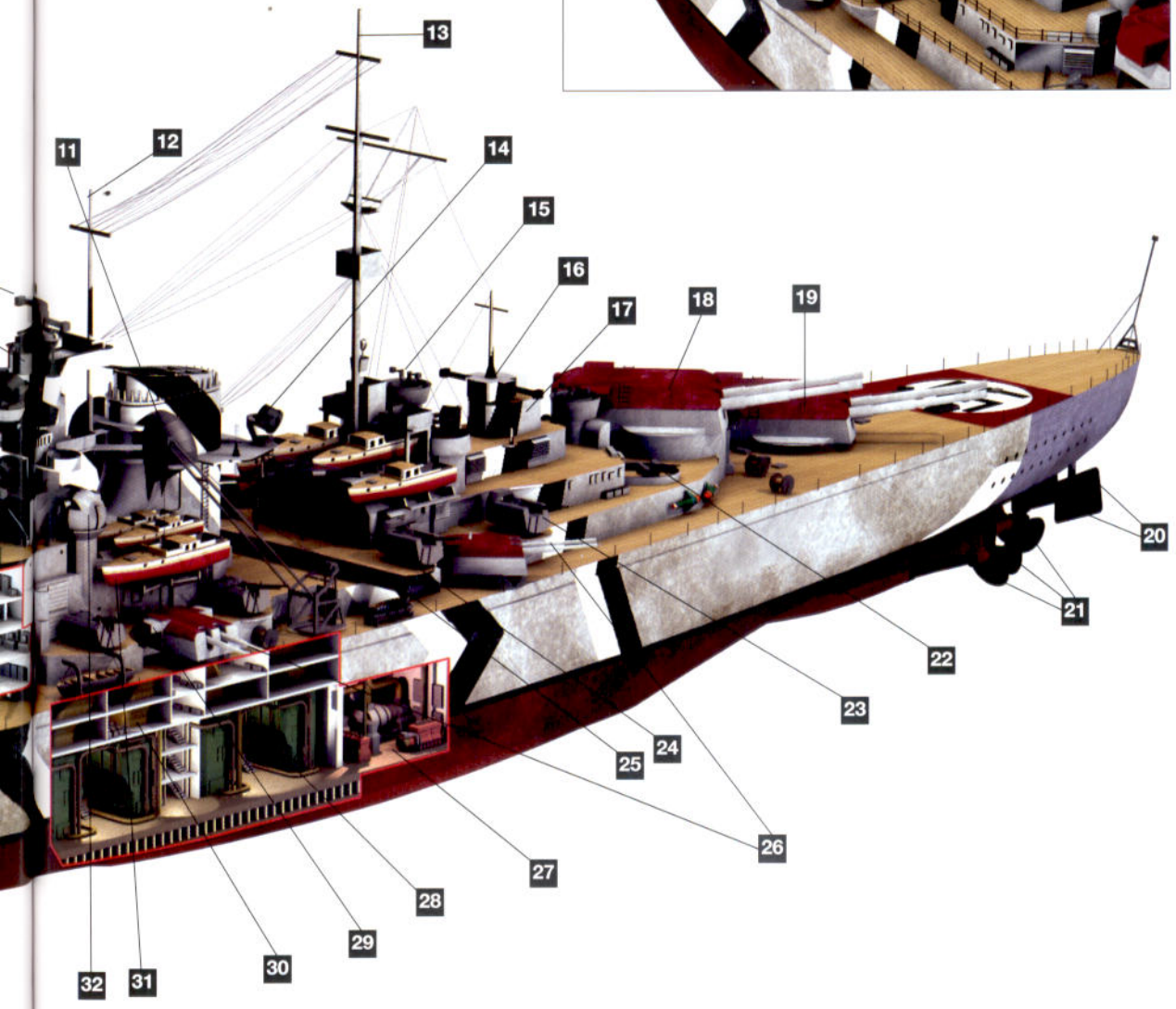




SPECIFICATION

Length: 250.5m
Beam: 36m
Draught: 0.2m at maximum displacement
Displacement: 35,000 tonnes (official),
50,900 tons (actual – fully loaded)
Speed: 30.8 knots
Range: 8,500 nautical miles maximum
Crew: 103 officers, 1,989 men
Armament: 8 x 38cm guns
12 x 15cm guns
14 x 10.5cm flak guns
16 x 3.7cm flak guns
20 x 2cm flak guns





E: *Gneisenau* post refit

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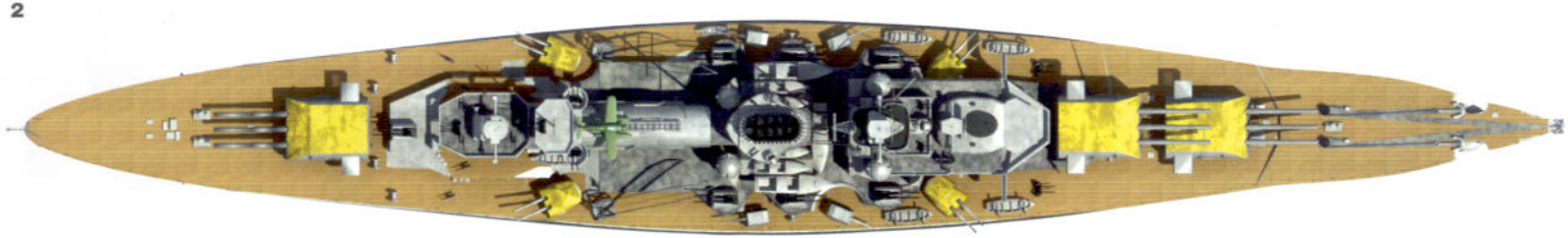

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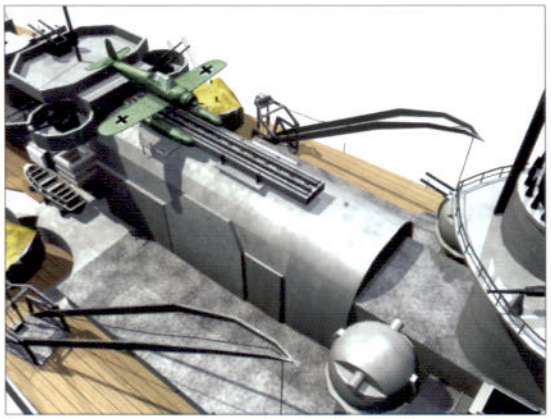

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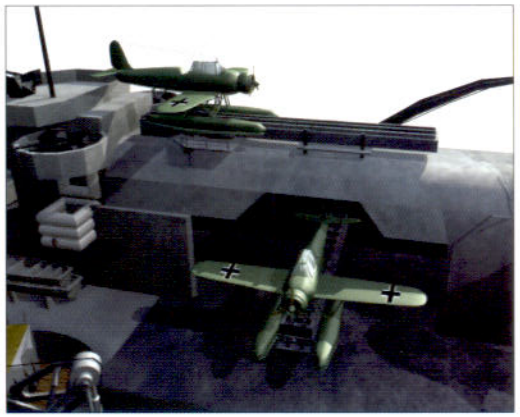
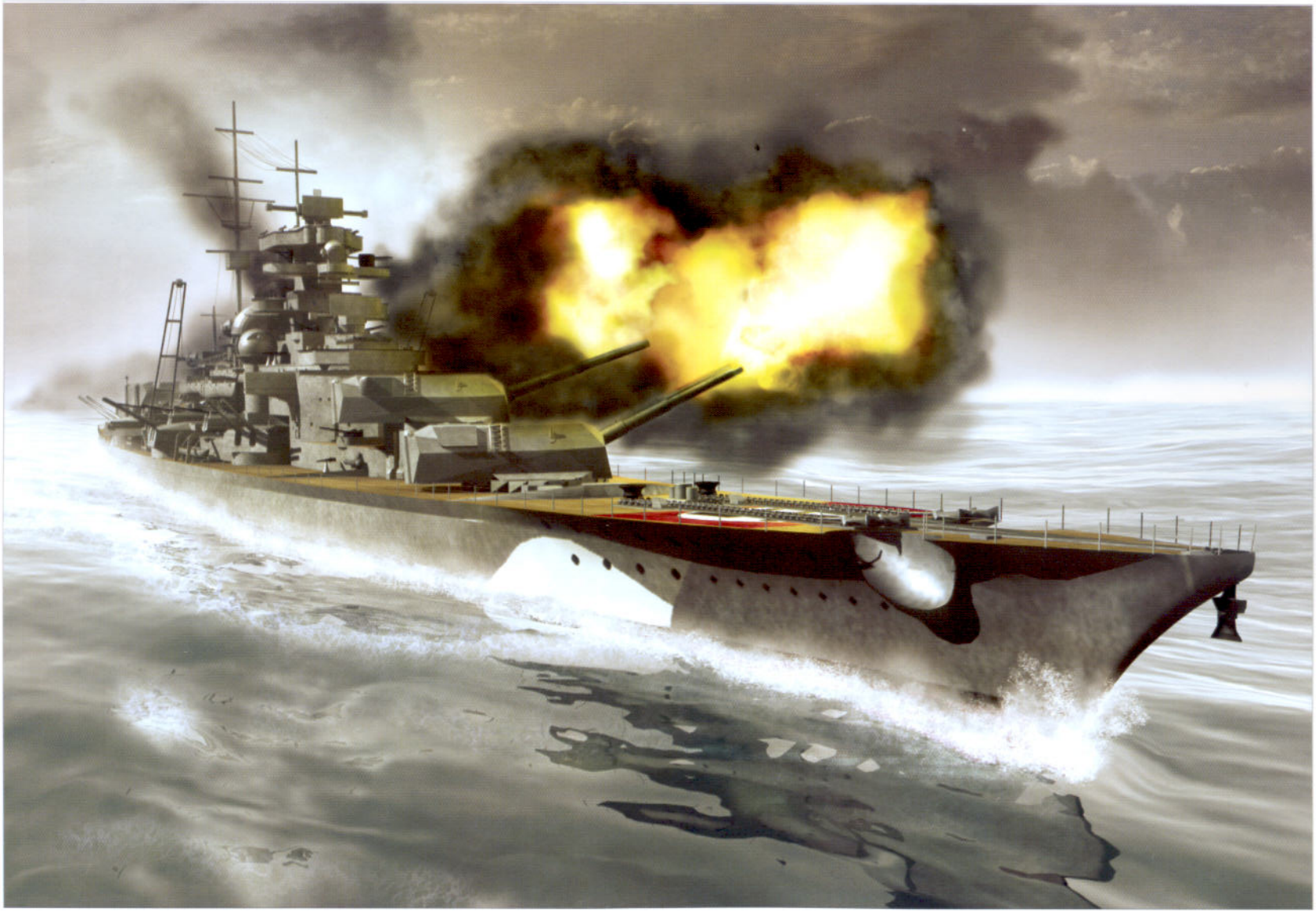


iii

F: *Bismarck* in action



G: *Tirpitz*

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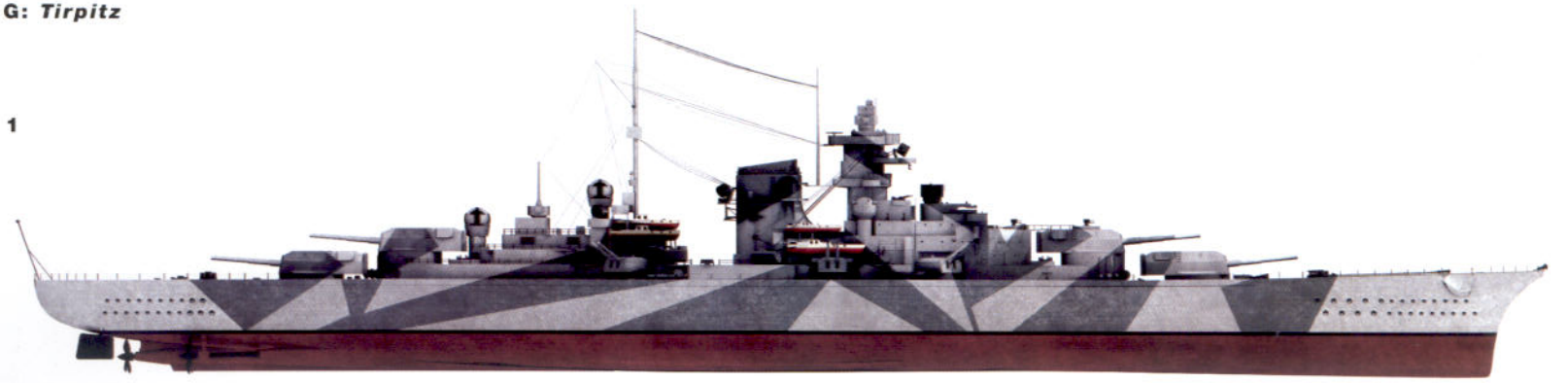

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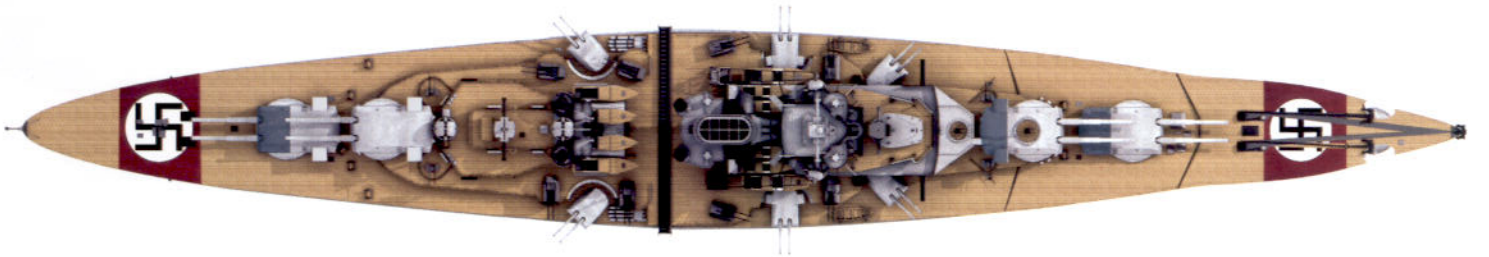

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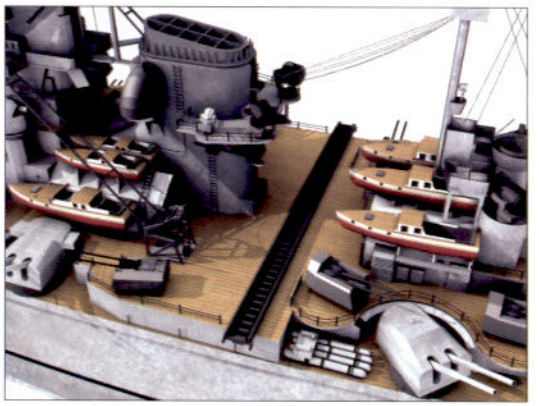

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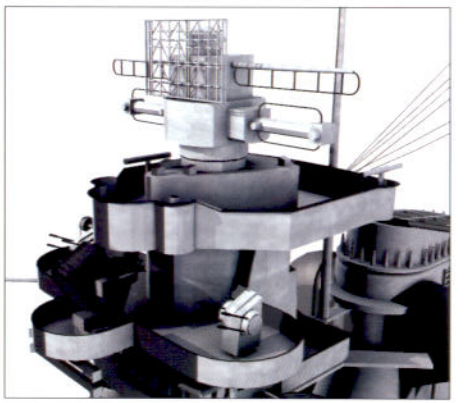

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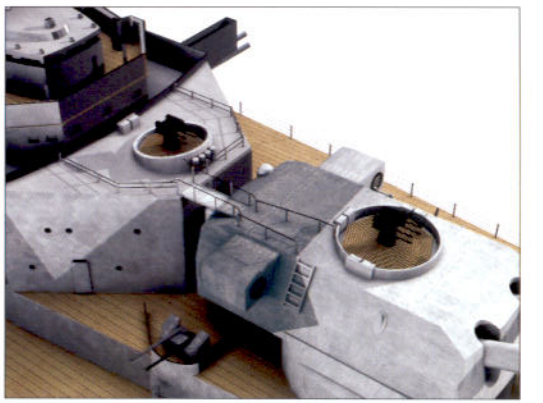
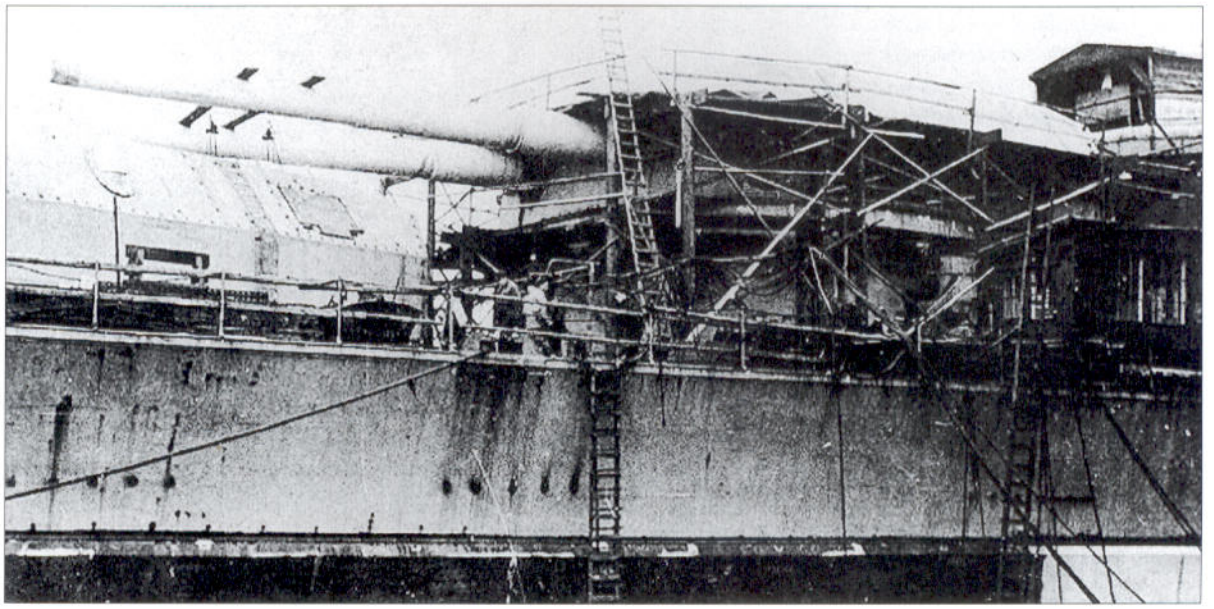




Construction of the main 38cm gun turret 'Bruno' during fitting out. The guns are in place and work is ongoing in building the armoured turret around them. The plethora of scaffolding and ladders is typical of a ship under construction.

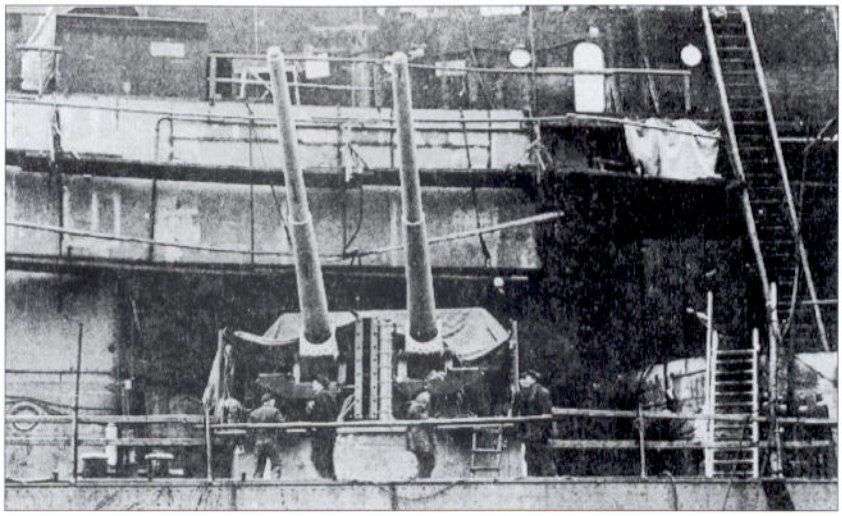
the day was out, a total of six battleships and battlecruisers, two aircraft carriers, 13 cruisers and 21 destroyers were involved in the hunt for *Bismarck*.

In the early hours of 25 May, *Bismarck* executed a turn to starboard and, describing a wide loop, came round behind her shadowing British warships and, having come full circle set off in a south-easterly direction towards St Nazaire. The British, blissfully unaware of *Bismarck*'s manoeuvre continued to head south and lost contact with their quarry. Even when they realised the German warship had escaped them, they assumed she had turned westwards and set off in pursuit, effectively increasing the distance between them and *Bismarck*. Unfortunately, Lütjens had not realised that he had given his pursuers the slip, and thus failed to maintain radio silence. The British were then able to gain a fix on his position by monitoring his radio transmissions.

Around 1030hrs on 26 May, lookouts on *Bismarck* spotted an enemy aircraft. It was a Catalina flying boat, which immediately signalled the battleship's position. *Bismarck* had been rediscovered. Around ten hours later, 15 Swordfish from HMS *Ark Royal* appeared over *Bismarck*. Despite a furious hail of fire from *Bismarck*'s flak artillery, the gallant biplanes pressed home the attack. A total of three torpedoes are believed to have hit the German battleship despite her violent manoeuvring. The first two hits were not fatal, but the third, one of the last to be launched just at the end of the attack, damaged and jammed *Bismarck*'s rudder, sending her into a permanent turn to starboard. It quickly became apparent that the damage was irreparable and *Bismarck* gradually turned away from her intended destination and towards the enemy ships that were pursuing her.

Bismarck's alarm bells began ringing just after 0830hrs on the morning of 27 May as the battleships *Rodney* and *King George V* appeared off her port bow. A few minutes later, *Rodney* opened fire, closely followed by *King George V*. *Bismarck* replied less than two minutes later. Both sides were remarkably accurate in their fire, but it was the British

guns that first drew blood. The first hits were scored on *Bismarck* just after 0900hrs as the British battleships swiftly began closing the range. Within 20 minutes, the two forward turrets on the heavily outgunned *Bismarck* were out of action and the forward fire control position blown away. By just after 0930hrs, turrets 'Caesar' and 'Dora' and their fire control position were also put out of action.

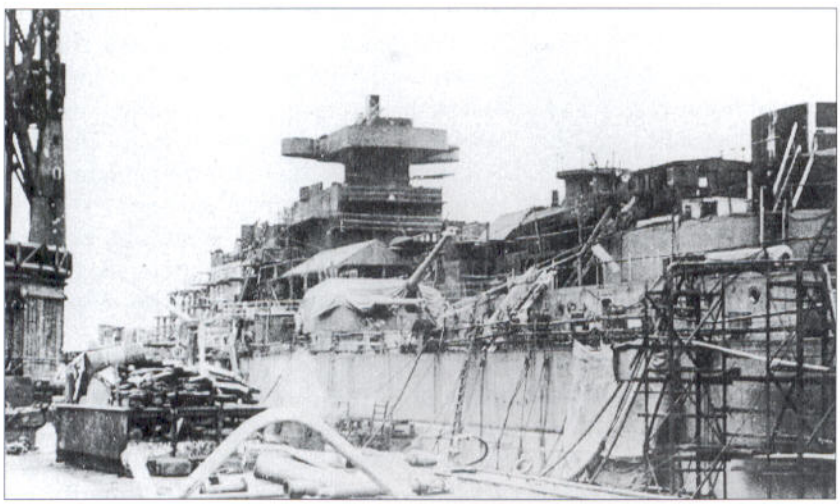


Construction of one of *Bismarck*'s 10.5cm twin heavy flak guns. Note how the barrels are first installed on the base mount, and then the turret housing built around them.

Though listing heavily, *Bismarck*'s hull was still intact and there was no immediate danger of her sinking. Her upperworks, however, had been devastated by what was effectively point-blank fire from the massive guns of *Rodney* and *King George V*, and she was clearly incapable of offering further resistance. Reluctantly, the order was given for *Bismarck* to be scuttled. At 1039hrs, *Bismarck*, listing so much she was virtually on her side and down by the stern, finally rolled over and sank. Survivors in the water watched in amazement, as her captain, Ernst Lindemann standing proudly on her fo'c'sle, saluted as he went down with his ship.

It should be noted that the most recent survey of the wreck of the *Bismarck* tends to suggest that although surviving crew members claimed that the ship was scuttled, the evidence now seems to imply that this action merely hastened the end, and that the *Bismarck* had been so damaged by the British torpedoes that she was in fact already slowly sinking.

Although many of the crew were trapped below decks as the mighty ship sank below the waves, a good number successfully escaped. Hundreds of men were fighting for survival in the cold waters of the



Bearing little resemblance to the sleek, graceful ship she would soon become, *Bismarck* is covered with clutter and liberally draped with electrical cabling to power the workers' tools and provide lighting to the ship's interior. The roofed structure just visible above the secondary turret is the port hangar for the ship's Arado 196 floatplanes.

Atlantic as the heavy cruiser *Dorsetshire* hove to and prepared to pick up survivors. The Tribal-class destroyer *Maori* also arrived on the scene and began to recover some survivors. Unfortunately, at this point a report was received of a U-boat periscope being sighted. It was a false alarm, though the British were not to know this and, fearful for the safety of their own ships, the British withdrew. By this time only 110 men had been recovered. Those still in the water were abandoned to their fate. Of *Bismarck*'s 2,092 crew, 95 per cent were lost.

BISMARCK SPECIFICATIONS

Displacement	50,900 tons, loaded
Length	250m
Beam	36m
Propulsion	3 x Blohm & Voss turbines developing a total of 150,170hp
Speed	30 knots
Endurance	9,280 nautical miles at optimum speed of 16 knots
Fuel Capacity	8,000 metric tons
Armament	8 x 38cm guns in four twin turrets, capable of firing projectiles weighing 800 kilos to a maximum range of 36.5km at a rate of 2 rounds per minute per barrel. 12x 15cm guns in six twin turrets, capable of firing 45.3-kilo projectiles to a maximum range of 23km at a rate of 8 rounds per minute per barrel. 14 x 10.5cm flak guns in twin turrets, firing 15-kilo projectiles to a maximum range of 17.7km at a rate of 18 rounds per minute per barrel. 16 x 3.7cm flak guns in twin turrets, firing projectiles weighing 0.75 kilo at a rate of 40 rounds per minute to a range of 8.5km. 12 x 2cm flak guns in a mixture of single- and quadruple-barrel mounts, 120 rounds (single barrel) or 220 rounds (quadruple barrel) per minute to a range of 4.9km. 4 x Arado 196 floatplanes
Crew	2,092

Ship's Commander

August 1940 – May 1941 Kapitän zur See Ernst Lindemann

Schlachtschiff Tirpitz

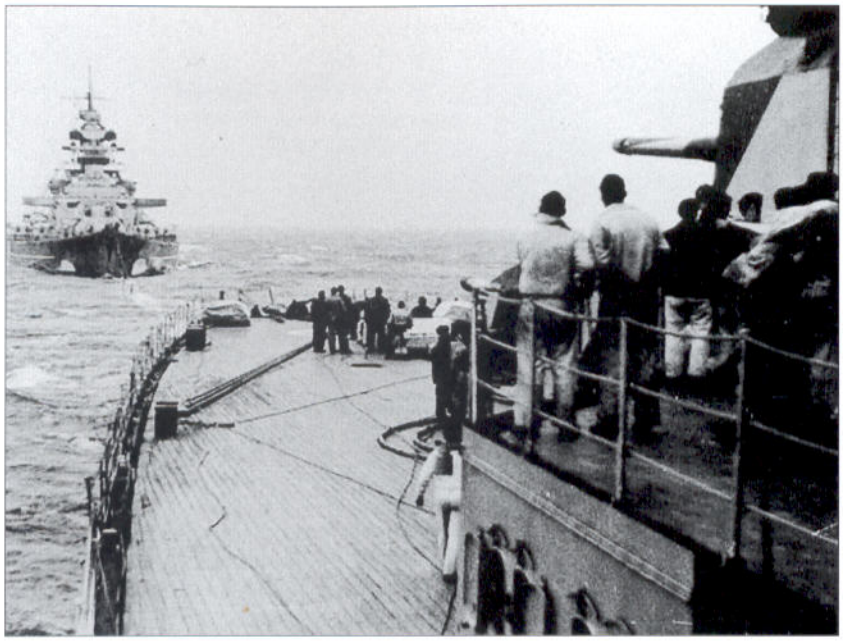
Sister to the *Bismarck*, this magnificent warship was laid down on 24 October 1936 at the Kriegsmarinewerft in Wilhelmshaven on a specially lengthened and strengthened slipway. She was named for Grossadmiral Alfred von Tirpitz (1849–1930). *Tirpitz* was a career sailor, having joined the Navy in 1869, and was heavily involved in developing the torpedo arm of the Navy. In 1897 he became Secretary of State for the Navy, a post he held until 1916 when he resigned in protest at the Kaiser's refusal to allow unrestricted submarine warfare.

On 1 April 1939 the new battleship was launched at Wilhelmshaven in an elaborate ceremony attended by Adolf Hitler and a large number of former dignitaries of the Imperial German Navy. The christening was performed by Frau von Hassell, daughter of Grossadmiral Tirpitz. Final building work and fitting out was not completed until February 1941, her formal commissioning into the Kriegsmarine being performed on 25 February. This was followed by brief initial trials before *Tirpitz* sailed for the safe waters of the Baltic, docking at Gdynia. In the Baltic she

carried out intensive training exercises and completed her trials.

On 5 May Hitler paid a formal visit to his latest battleship and also to her sister, *Bismarck*, which was also anchored at Gdynia.

Following the invasion of the Soviet Union, Operation Barbarossa, in June 1941, the Germans feared that the Soviet fleet would attempt to break out from its bases into the Baltic. Accordingly, the light cruisers *Emden*, *Leipzig*, *Köln* and *Nürnberg*, the heavy cruiser *Admiral Scheer* and, for a short period, the *Tirpitz* were formed into a 'Baltic Fleet' to counter any such eventuality. After spending a few days patrolling near the Aland Islands, *Tirpitz* resumed her training exercises, and eventually returned to Kiel.



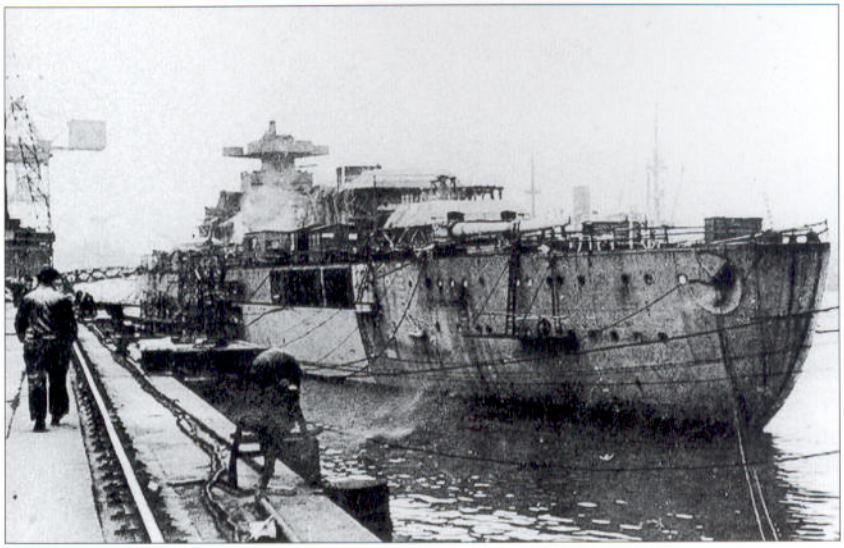
***Bismarck* carrying out refuelling from *Prinz Eugen* during training exercises. The massive beam of this huge warship can be seen to good effect here. The dark grey forward part of the hull and false bow waves can also be seen clearly.**

On 12 January 1942 *Tirpitz* weighed anchor in Kiel, and after a brief refuelling stop in Wilhelmshaven, sailed for Norway. She was to be part of a force of heavy German warships intended to discourage any Allied thoughts of invading. *Tirpitz* was to be the flagship of this group and on 16 January she dropped anchor in Aasfjord near Trondheim.

On 6 March *Tirpitz*, in company with three destroyers, made a brief sortie against the British Arctic convoys. Weather conditions were appalling and attempts to find the enemy merchant ships failed. The German ships were detected by the British, however, and an attack made on *Tirpitz* by Allied torpedo bombers. All of the torpedoes were successfully avoided, and *Tirpitz* safely returned to her anchorage on 12 March.

The British were determined to eliminate the menace that *Tirpitz* posed to their convoys, and on 30 January the first of many raids on *Tirpitz's* anchorage was carried out by Lancaster heavy bombers. A second attempt was made on 30 March. Both raids, however, were defeated by a combination of bad weather conditions and heavy German anti-aircraft fire.

One of the last photographs taken of *Bismarck*. Shot from *Prinz Eugen*, she can be seen to be down by the bows having shipped a considerable amount of water through the hole caused by a direct hit from *Prince of Wales*.



The massive turret 'Dora' can be seen in this stern view of *Bismarck* during her fitting out.

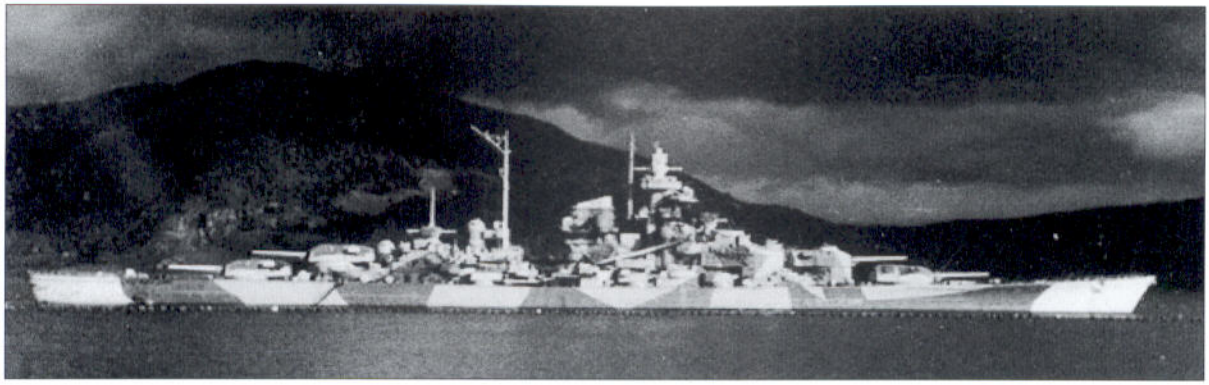
With both an improvement in weather conditions and an increase in the availability of fuel, June 1942 saw the planning of a new sortie, intended to intercept a particularly large Allied convoy, PQ 17, on its way to Murmansk. On 1 July *Tirpitz* departed her anchorage and, in company with five destroyers and two torpedo boats, set off to intercept the enemy merchant ships. At the same time, a second German squadron consisting of the heavy cruisers (formerly pocket battleships) *Lützow* and *Admiral Scheer* with a further five destroyers set off from Bogenfjord to join with *Tirpitz*. As far as the German surface units were concerned, the operation was somewhat of a fiasco. Three of *Tirptz*'s destroyer escorts ran aground, as did the *Lützow*. By the time the German ships began to draw near to the operational area, German intelligence had discovered that the British had become aware of the impending attack and had scattered the convoy. This left the ships more vulnerable to U-boat attacks than to attacks by surface ships, which would have to hunt them down individually, so the surface units were recalled. In the event, PQ 17 was virtually annihilated by the combined efforts of the U-boats and Luftwaffe bomber aircraft. *Tirpitz* was subsequently ordered to Trondheim where she underwent a minor refit.

Pronounced battleworthy in January 1943, *Tirpitz* moved to Altafjord where along with *Scharnhorst* and *Lützow* she was heavily involved in training exercises that lasted until mid-summer.

In September *Tirpitz* took part in the brief sortie against Allied shore installations on Spitzbergen Island, using her 38cm main armament in anger for the first time before returning safely to her anchorage. On the night of 22 September, however, the mighty battleship was severely damaged when six British midget submarines succeeded in penetrating the German anchorage. Two were successful in laying charges under the hull of *Tirpitz*. These exploded just after 0800hrs on 23 September. Although only one crewmember was killed, damage to the ship itself was extensive; turrets, rangefinders, fire control centres, aircraft catapults, rudders, main shafts, engines, generators and steam pipes were all badly affected. To all intents and purposes, *Tirpitz* was now out of commission.

Fully six months were required for the most essential repairs to be carried out, these being performed by a massive workforce of over 1,000 dockyard workers specially allocated to this job from yards in Germany and working from an accommodation ship moored alongside the damaged giant.

Members of the Norwegian underground kept the Allies well informed of the progress of these repairs, and by the time *Tirpitz* was



This atmospheric shot shows *Tirpitz* at her anchorage. Note the light/dark grey splinter-pattern disruptive camouflage. This was one of several paint schemes sported by *Tirpitz* during her service career. Additional quad 2cm anti-aircraft guns have been fitted to the roof of turret 'Bruno' and the forward part of her main superstructure, and the ship is surrounded by anti-torpedo netting.

once again ready to undergo fitness trials in March 1944, British aircraft were ready to attempt a further bombing attack. On 3 April the weather was finally good enough for the British to act, and a mixed force of fighter aircraft and torpedo bombers consisting of over 164 aircraft was available. After first strafing the battleship to eliminate as many of the flak gunners as possible, a tactic which paid dividends with heavy losses amongst the *Tirpitz*'s gun crews, the British bombers arrived and dropped a total of 99 bombs on the battleship, in two separate attack waves. Sixteen direct hits or near misses were scored. Almost 450 of *Tirpitz*'s crew were either killed or wounded, but despite the number of bomb hits she had suffered, only around one month was required for the repair workers on site to remedy the damage, and *Tirpitz* was once again ready for trials by the beginning of July.

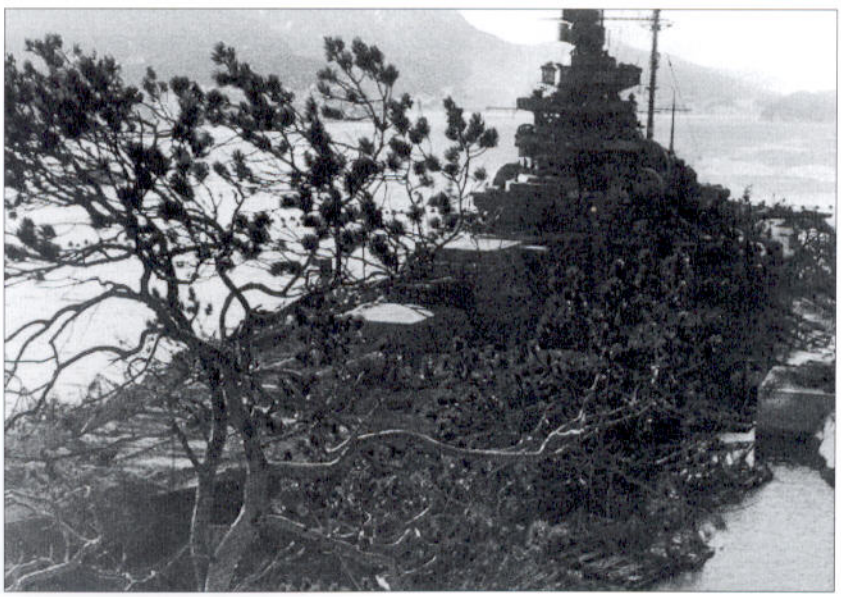
A subsequent British attack shortly afterwards was detected early enough for a fully effective smokescreen to be laid around the ship and no damage was suffered, the attackers being driven off by heavy German anti-aircraft fire.

During the end of July and beginning of August, *Tirpitz* carried out her final sea trials, escorted by a number of destroyers, before returning to her anchorage for the last time.

Three further bombing attacks were made on *Tirpitz* during August, but although the first, on 22nd of that month, caused one fatality and the second, on 24th August, a further eight fatalities amongst crewmembers, no significant damage was done to the ship, which remained fully battleworthy.

These attacks had been carried out predominantly by light torpedo bombers such as the Fairey Barracuda, but now RAF Bomber Command was

Tirpitz at her mooring, shrouded by camouflage netting. Even when damaged severely enough to prevent any further combat use, she represented a serious enough threat that the British spared no effort in seeking her total destruction.



A tug slowly manoeuvres *Tirpitz* into her mooring site in the flat, calm waters of Kaafjord.

preparing to become involved in the elimination of this ship that represented such a potential threat to Allied convoys.

On 15 September a force of some 27 four-engined Lancaster bombers, most carrying a new, large and devastating bomb known as the 'Tallboy', packing 12,000lbs of explosive, set off from a Soviet airfield in Murmansk. By the time they reached *Tirpitz*, she was well warned and had succeeded in laying a thick smokescreen over the entire area of her anchorage. Despite these difficulties, and a ferocious flak defence, one direct hit was achieved on the ship's fo'c'sle. This bomb penetrated right through the ship, exiting through her hull bottom and exploding right under her keel. Damage was extremely serious. Apart from severe flooding through the hole in her hull and some 1,500 tonnes of seawater being shipped, the explosion had damaged her keel and many of her decks hade been forced upwards by the explosion. Fire control and radar equipment also suffered significant damage. Despite the fact that only five crewmen were wounded and no fatalities were suffered, *Tirpitz* was once again out of commission.

In view of the circumstances, it was decided not to restore her to battleworthy condition again, but to tow her to a suitable location where she could be used as a floating gun battery. *Tirpitz* was subsequently anchored off the island of Haaköy in shallow waters where it was hoped that even if she did suffer further attacks, the worst-case scenario might be that she would simply settle on the bottom, with her armament still useable. Accordingly, sufficient emergency repairs were made to allow *Tirpitz* to make her own way to her new anchorage, where she arrived on 16 October.

She was, however, detected almost immediately by British aircraft and on 29 October another heavy bombing raid was launched against her. This time, despite her smoke screen only being partially formed, no direct hits were scored. A near miss off her port stern quarter buckled some of her plating and led to further flooding.

At this point any attempts to carry out further repairs were abandoned and any unnecessary materials were removed from the ship. All those crewmen whose specialist skills were no longer required also left the ship at this point. In order to bolster her protection against air attack, two flak ships were anchored near to her and a number of flak positions established on shore.

On 12 November, however, a further force of Lancaster bombers carried out a new attack. Two direct hits were scored right at the start of the attack, ripping a massive hole in her hull and causing a 15-degree list. Further hits over the next few minutes saw the list increase to 40 degrees and resulted in the order being given to abandon the lower decks. Within just nine minutes of the first bomb falling, the list had increased to 70 degrees, and a fire raging in one of the secondary

armament turrets spread to the magazine for turret 'Caesar', which exploded, hurtling the massive turret into the air. Two minutes later, the battleship capsized. By a cruel quirk of fate, right under the *Tirpitz*'s hull was a deep hole in the anchorage floor into which the tower and funnel neatly rolled, allowing the *Tirpitz* to capsize fully rather than settle on the shallow bottom as had been hoped. Although over 800 crewmen were saved, over a thousand others were trapped in the upturned hull. Rescue workers succeeded in cutting through her upturned hull bottom and rescued a further 82 crewmen. The final death toll was 971.

The wreck of the *Tirpitz* lay at her anchorage until after the war when she was, over a long period stretching into the 1950s, gradually broken up for scrap. Even today, specially mounted souvenir pieces of her armour plating are being sold by a Norwegian concern.

OPPOSITE **The quarterdeck of *Tirpitz* at her Norwegian anchorage. Note the heavy canvas tarpaulins draped over her turrets and gun barrels. Her crew are busy adding further camouflage material such as tree branches and foliage. Despite all efforts at concealment, members of the Norwegian underground kept British intelligence well informed as to her position.**

TIRPITZ SPECIFICATIONS

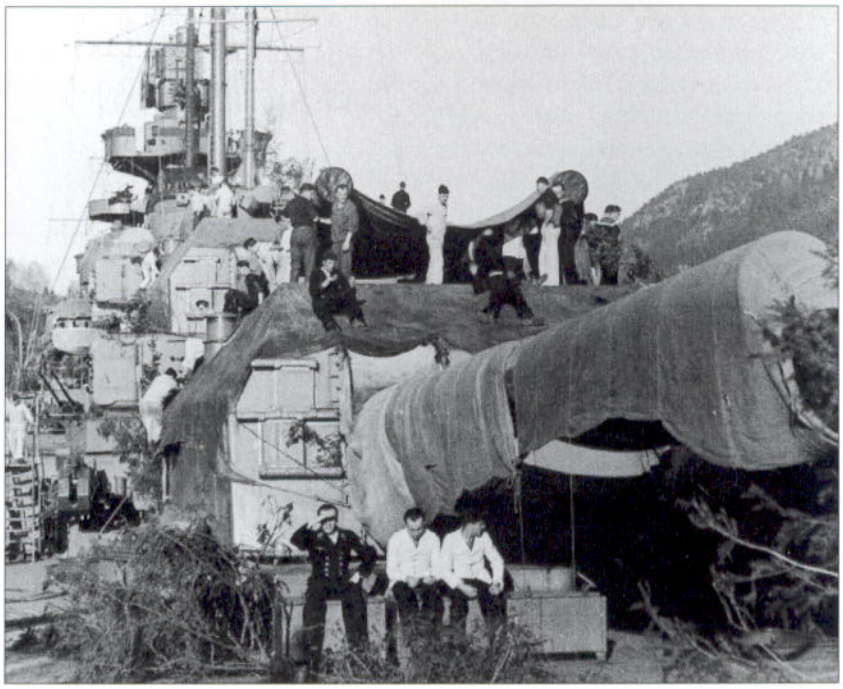
Displacement	53,500 tonnes, loaded
Length	253m
Beam	36m
Propulsion	3 x Brown-Boveri turbines developing a total of 150,170hp
Speed	30 knots
Endurance	9,280 nautical miles at optimum speed of 16 knots
Fuel Capacity	8,000 metric tons
Armament	8 x 38cm guns in four twin turrets, capable of firing projectiles weighing 800 kilos to a maximum range of 36.5km at a rate of 2 rounds per minute per barrel. 12x 15cm guns in six twin turrets, capable of firing 45.3-kilo projectiles to a maximum range of 23km at a rate of 8 rounds per minute per barrel. 16 x 10.5cm flak guns in twin turrets, firing 15-kilo projectiles to a maximum range of 17.7km at a rate of 18 rounds per minute per barrel. 16 x 3.7cm flak guns in twin turrets, firing projectiles weighing 0.75 kilo at a rate of 40 rounds per minute to a range of 8.5km. 78 x 2cm flak guns in a mixture of single- and quadruple-barrel mounts, 120 rounds (single barrel) or 220 rounds (quadruple barrel) per minute to a range of 4.9km. 8 x 53.3cm torpedo tubes in two quadruple mounts. 4 x Arado 196 floatplanes
Crew	2,608

Ship's Commanders

February 1941 – February 1943	Kapitän zur See Karl Topp
February 1943 – May 1944	Kapitän zur See Hans Meyer
May 1944 – November 1944	Kapitän zur See Wolf Junge
November 1944	Kapitän zur See Robert Weber

Colour Schemes

Both *Bismarck* and *Tirpitz* began their careers with the typical pale grey colour scheme of the early war period. During their training and trials, both used the so-called 'Baltic' scheme of bold black/white angular stripes across the hull and superstructure and with darkened forward and stern hull portions intended to give the impression of a shorter hull length, emphasised by the addition of false bow and stern waves. The



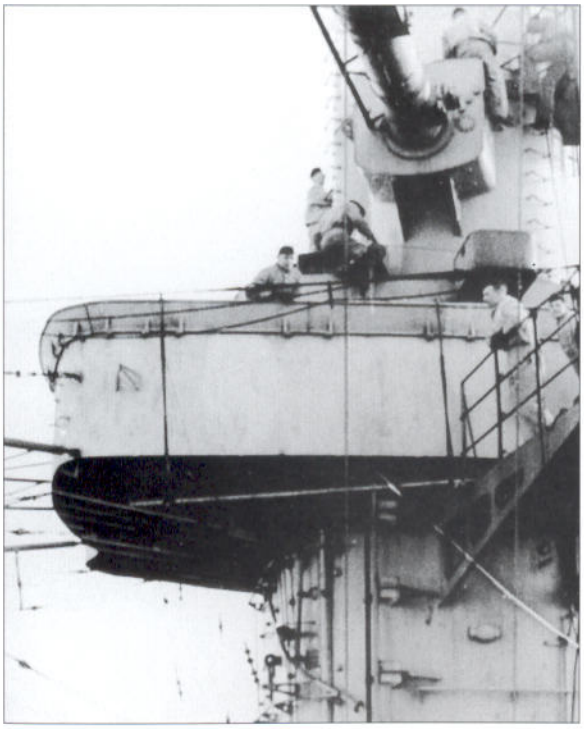
turret roofs of the main armament and principal secondary armament were painted red during this period.

Bismarck had her camouflage scheme painted out before departing on the fateful Operation *Rheinübung*. *Tirpitz* went on to sport a number of camouflage schemes. From summer 1942 to spring 1944 she featured variants of a dark grey splinter scheme over her basic paler grey surfaces. Thereafter her hull, 'Anton' and 'Dora' turrets and lower superstructure were finished in dark grey with the remainder in paler grey.

FIRE CONTROL/RANGEFINDING

Each of the main armament turrets in the *Scharnhorst*- and *Bismarck*-class battleships, with the exception of turret 'Anton' in the *Bismarck*, was provided with 10.5m rangefinders. The viewing ports for these are within the projecting housings, which may be seen in the rear corners of these turrets. The centre of each of the three main secondary armament turrets of the *Bismarck* class were also provided with their own basic 7m rangefinder devices.

A view from astern, looking up towards *Scharnhorst*'s foretop with the principal rangefinder for controlling the main armament.



Forward of the bridge tower on both classes of battleship were fitted 7m rangefinders in a rotating circular domed housing. These could be used to control both main and principal secondary armament.

On the foretop was a large armoured rotating housing containing a 10.5m rangefinder. This was the principal fire control rangefinder for the main armament but it to could control the principal secondary armament. A further 10.5cm in a similar rotating housing was located on the stern control centre, just forward of turret 'Caesar'.

On both the *Scharnhorst*- and *Bismarck*-class battleships will be seen spherical housings either side of the bridge area. These are the fire control rangefinders for the 10.5cm heavy flak guns, with 4m rangefinders in each. On the *Bismarck* class a

further such housing was located just aft of the mainmast, and a final example between the stern 10.5m rangefinder and turret 'Caesar', each on the centre line of the ship. On the *Scharnhorst* class, one was positioned to either side of the funnel. These rangefinder housings were gyroscopically stabilised. The twin flak mountings themselves were also gyro-stablised and featured on-board rangefinders on each gun for use when in operation against surface targets as opposed to enemy aircraft.

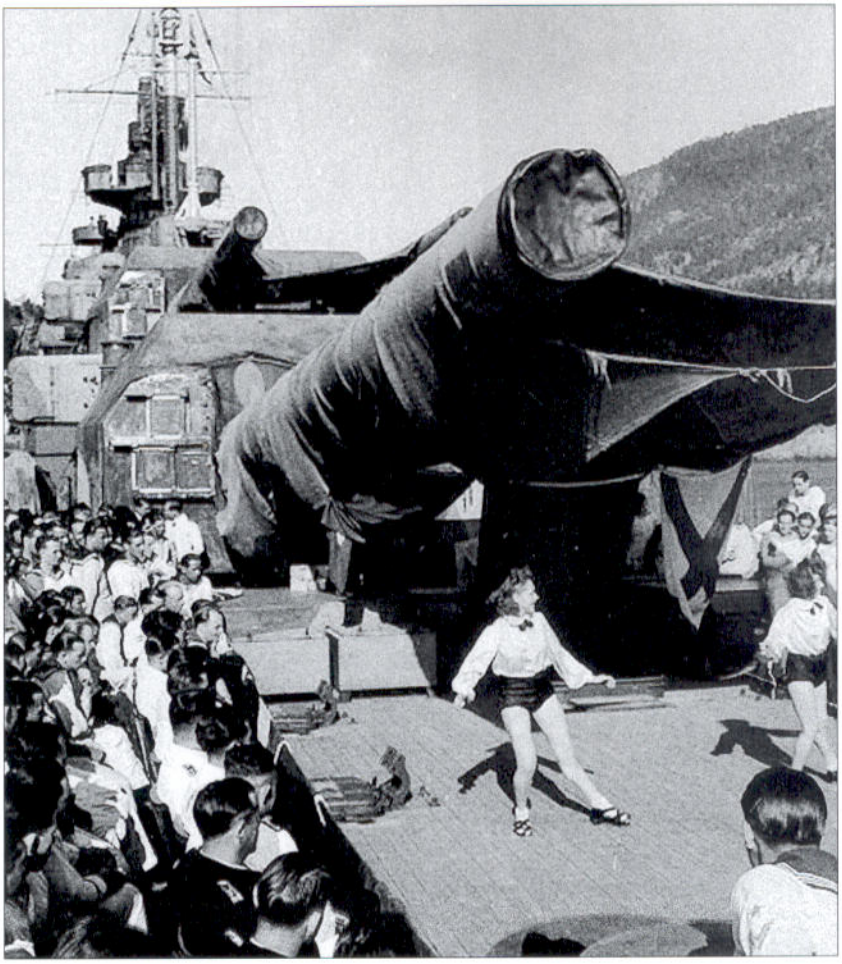
The smaller calibre 3.7cm and 2cm flak weapons had their rangefinders on the weapons themselves, though a number of smaller rangefinders were located about the ships (i.e. on *Scharnhorst*-class ships a smaller open rangefinder was located on a small platform on the face of the main tower).

RADAR

In the late 1920s and early 1930s Germany had been active in pioneering radar, with the Reichsmarine being one of the keenest advocates of the new technology. In 1934 a foundation known as the *Gesellschaft für Elektroakustische und Mechanische Apparate*, was established to promote further development of the infant systems and by 1935 a fully operational 48 cm wavelength (630 MHz) radar set was demonstrated to the C-in-C Navy. Shortly after being installed for the first time in an operational warship, the system was altered to 82cm (370 MHz) and this became the standard for naval use. After the outbreak of war, however, inter-service rivalry and a general feeling that the systems had been developed as far as was feasible led to a stagnation in development, allowing the Allies to overtake the Germans.

Both *Scharnhorst* and *Gneisenau* were provided with a FuMO 22 (FuMO, *Funkmessortungsgerät*) radar set in 1939, attached to a housing above that of the foretop rangefinder. This system had a large 6m x 2m 'mattress' antenna. *Gneisenau* had this equipment upgraded to the FuMO 27 version, with the smaller 4m x 2m antenna, in January 1941. *Scharnhorst* also had this improvement carried out in 1942. Both ships sometime in late 1941 or early 1942 also had a FuMO 27 apparatus affixed to the stern rangefinder housing. The FuMB 4 *Samos* (*Funkmessbeobachtungs-Gerät*) radar array was also affixed to the foretop housing

Heavy work for crewmen of the *Scharnhorst* as they clean out the bore of one of the main 28cm guns.



Boredom was a major problem for crewmembers in their lonely Norwegian outpost. Here we see members of an entertainment troupe performing for the crew on *Tirpitz*'s quarterdeck.

immediately below the FuMO 27 at the same time.

Bismarck and *Tirpitz* were initially provided with identical radar equipment comprising a FuMO 23 apparatus attached to the forward, foretop and stern main rangefinders. The antenna array on this type measured some 4m x 2m.

Tirpitz eventually had her forward array replaced with the FuMO 27, and the foretop set provided with a FuMO 27 housing atop the existing FuMO 23. Ultimately, the FuMO 26 array, whose larger antenna measured some 6.6m x 3.2m, was fitted on the foretop. In 1944, a FuMO 30 *Hohentweil* radar set was mounted in her topmast and a further FuMO 213 *Wurzburg* radar array on the forwardmost of her stern 10.5cm flak rangefinder housings.

Both the *Scharnhorst*- and *Bismarck*-class battleships, handsome vessels though they were, were obsolete before they were even launched. German capital ships, small in number and thus heavily outnumbered, were never intended to be thrown into action against enemy battleships, being intended rather as surface raiders wreaking havoc amongst convoys of merchant ships. For this task they were well suited, with high speed and powerful armament. Even when they did encounter enemy capital ships, as in the case of *Bismarck*, when on reasonably equal terms, they could more than hold their own. Even the most powerful of battleships, however, were extremely vulnerable to air attack, as the *Bismarck* episode so clearly illustrated when a single torpedo, which had it hit her almost anywhere else would have had little significant effect, hit her rudder, sending her into a permanent turn which destroyed any chances of her escaping her pursuers.

Great Britain, too, suffered serious losses from enemy aircraft when both *Renown* and *Prince of Wales* were sunk in a single engagement by Japanese aircraft. The Imperial Japanese Navy suffered a similar fate when the mighty *Yamato*, the largest and most powerful battleship ever built, was sunk by US aircraft.

By the end of the Second World War, the battleship had become an anachronism, and within a few years all but a handful of them had been consigned to the breakers' yards.

COLOUR PLATE COMMENTARY

A: *SCHLESWIG-HOLSTEIN* CLASS

This plate shows the two old dreadnought battleships *Schlesien* and *Schleswig-Holstein* in various guises.

1 Here we see the elderly *Schlesien*, full hull, in her pre-refit appearance. The colour scheme is the typical overall very pale grey as seen on most large, pre-war German warships, with black waterline and red lower hull. She still has the secondary armament mounted in hullside sponsons, a feature deleted on subsequent refitting, and retains the original three-funnel configuration. The inset shows her bow crest, a black Silesian eagle on a white shield.

2 This waterline view shows *Schlesien* after her major refit. The forward funnel has been removed and substantial reworking has altered the superstructure. Note the bulged hullside sponsons towards the bow and stern have been removed and the sponsons amidships have been blanked off, their guns having been removed. No ship's crest is fitted at the bow at this stage, these being removed on the outbreak of war. Her anti-aircraft armament has also been considerably upgraded.

3 This view shows *Schleswig-Holstein* after her first major refit. Note the trunking from the original forward funnel position leading to the centre (now the forward) funnel. All of the midship sponsons still bear their guns. The forward and aft sponsons are still present but have been blanked off and their guns removed. On the bow is the ship's crest, the insignia of the state after which she was named. The left half swastika, mounted to the rear hullside just aft of the rearmost sponson. This feature was also removed after the outbreak of war.

Members of her crew, including at bottom right, the Luftwaffe crews of her Arado floatplanes, gather on *Tirpitz*'s starboard main deck, overlooked by the massive gun barrels of turret 'Bruno'.

B: *SCHARNHORST* IN ACTION

This plate shows *Scharnhorst* at sea during the action with the auxiliary cruiser *Rawalpindi*. *Scharnhorst* is seen in her post-refit configuration, with the 'clipper' bow fitted. In the heavy seas, waves are crashing over her bows and fo'c'sle. The *Scharnhorst* and her sister were known for being 'wet' ships, and often suffered serious mechanical and electrical problems due to the amount of water shipped over her forward end in even moderately heavy seas. Her forward turrets are turned to starboard as she prepares to let loose a broadside at the plucky armed merchantman. Note that her main and principal secondary armament turret tops are painted yellow. Painting these areas in colours such as red, blue or yellow on major warships was a standard recognition measure.

C: THE *SCHARNHORST* CLASS – AS BUILT

This plate shows the battlecruisers *Gneisenau* and *Scharnhorst* as completed, with straight stem, no funnel caps, and with the secondary aircraft catapult on turret 'Caesar'. Both ships, as originally completed, were almost identical, the principal difference being in the design of the main seaplane launch catapult and hangar area, as shown in the insets below.

1 *Gneisenau/Scharnhorst* in their initial pre-war colour scheme of very pale grey. On plan view (2), the teak main decks can be seen. The upper decks on most warships were finished in a non-slip material seen here as a dark grey colour.

The ship's crest worn on *Gneisenau*'s bow is in the form of a quartered shield in pale green/gold. On the green areas are black Prussian eagles, and on the gold quarters a sword within a green laurel wreath. *Scharnhorst*'s bow shield would consisted of a white bar running across a dark blue shield, though in some period photographs these colours appear to be reversed with a white bar running across a dark field. The white bar on blue, however, is historically accurate as the crest of *Scharnhorst*.

Though both ships are extremely handsome vessels, their sleek lines would be greatly enhanced by the 'clipper' or 'Atlantic' bows and raked funnel caps that were to be fitted during subsequent refits, as well as the removal of the cumbersome aircraft catapult on turret 'Caesar'.

Inset i) shows the original stern. Note that the port side stern anchor sits snugly in a recess in the shape of the anchor itself. Pre-war, most large German warships had a large bronze eagle and swastika fitted to the stern. These were removed on the outbreak of war. Note the small railing just below the eagle.

Inset ii) shows the original aircraft catapult fitted to the roof of turret Caesar. This rather unwieldy arrangement with the aircraft exposed to the elements, especially in heavy seas, was removed in March 1940.

Inset iii) shows the redesigned *Scharnhorst* bow. Note that the anchor now sits at a cluse on the forecastle rather

The heroes of German history after whom the four great battleships were named. Top left: Otto von Bismarck; top right: Alfred Tirpitz; bottom left: Scharnhorst; bottom right: Gneisenau;

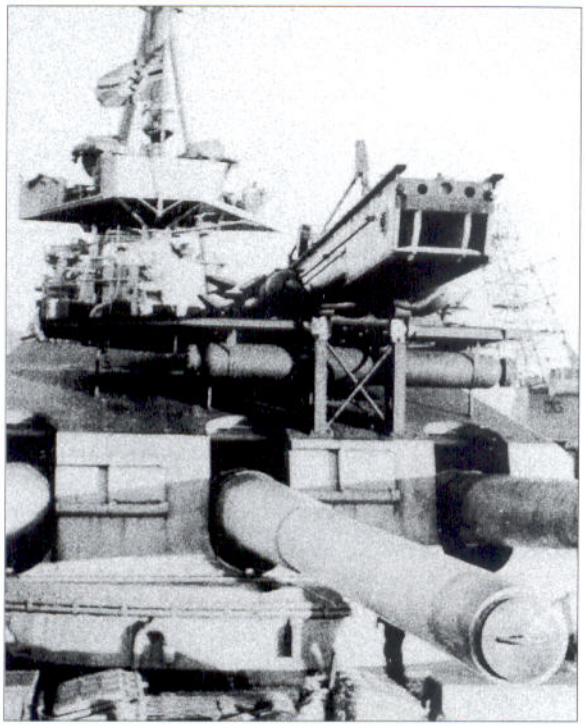
than the anchor chain emerging from a hawse-hole on the hull side. At the same time as this alteration was carried out, the number of port side anchors was reduced from two to one as shown.

D: CUTAWAY VIEW – *BISMARCK*-CLASS BATTLESHIP

The mighty *Bismarck*, pride of the German Navy, was a true colossus. With a maximum displacement of 50,900 tonnes, she was, as well as being a formidable fighting machine, virtually a floating city, accommodating as she did 103 officers and 1,962 men plus a further 27 men intended to act as prize crews for captured enemy ships. A number of Luftwaffe personnel also served on board, to crew the ship's Arado 196 floatplanes.

Bismarck was powered by three sets of turbine engines, served with high-pressure steam by 12 massive boilers, in three boiler rooms each containing four boilers, The turbine driving the central propeller shaft was sited furthest aft, with those driving the port and starboard shafts set amidships on each side. Massive diesel generators were also provided to supply the great ship with electrical power.

The vast bulk of *Bismarck*'s weight was made up by her armour plating. Her main deck was laid on 50mm thick armour plate. One deck below this was the main armoured deck, with plating varying from 80 to 110mm thick. It was intended that projectiles would penetrate the upper deck then explode, the blast being contained by the main armoured deck. The main critical internal areas such as the



This view of turret 'Caesar' on *Scharnhorst* gives excellent detail of the second aircraft catapult, subsequently removed. Note the tompions that have been fitted to the ends of the gun barrels to protect the bore when not in use.

engines, boilers and magazines were protected by an armoured belt some 320mm thick, the hullside above this belt reducing to some 120–145mm.

Bismarck was also provided with excellent underwater protection against torpedo hits. Apart from the fatal hit in the area of her only real Achilles' heel, the rudder/steering mechanisms, few of the torpedo hits she suffered would have been considered mortal wounds. In fact, even in her final moments, her upperworks battered almost beyond recognition, she was in no imminent danger of sinking until her own crew opened the seacocks and proceeded to scuttle her.

The main gun turrets also contributed significantly to *Bismarck*'s overall weight. They were protected by armour ranging in thickness between 150 and 360mm. Each of her eight main gun barrels for the 38cm main armament weighed over 1,000 tons.

Bismarck's crew was well provided for. Amongst the specialists on board were doctors, dentists, cooks, bakers, cobblers, laundry workers, tailors and a ship's band, all working in well-appointed conditions, with the most modern of equipment.

The crew was divided into 12 'divisions', each of which numbered up to a maximum of 220 men. Divisions 1 to 4 manned the main and secondary armament, with divisions 5 and 6 manning the flak armament. Division 7 provided the ship's cooks, bakers, carpenters and similar trades. Division 8 was ordnance technicians, division 9 signallers and radio operators and divisions 10 to 12 were the engineers.

In peacetime, daily life for the crew began with reveille at 0600hrs. Breakfast was served at 0630 and was followed by a period of cleaning up and sweeping the decks, this lasting for around 45 minutes. The crew then mustered to be allocated their duties at 0800. This usually consisted of training exercises, classroom training or maintenance work. After lunch break, this work period was repeated and ran until around 1700 when evening meals were served. Following the evening meal, the crew once again was put to work cleaning the decks before being stood down. The crew would turn in at 2200.

E: *GNEISENAU* POST REFIT

1 *Gneisenau* during 'Operation Berlin' in profile (**1**) and plan view (**2**). Overall colour is still the early pale grey with the roofs of the main armament and principal secondary armament turrets painted yellow. The main difference between the two sister ships, *Gneisenau* and *Scharnhorst* of the *Scharnhorst* Class was the re-siting of the mainmast on *Scharnhorst* to the rear of the hangar and the design of the hangar itself. With *Gneisenau*, it remained attached to the rear of the funnel.

Inset i) shows the unique aircraft hangar installed on *Gneisenau* whilst in Brest over the winter of 1941–42. One aircraft could be stowed on rails on the hangar roof whilst another two were stowed, wings folded, inside the hangar.

Inset ii). The sternmost door panel on the hangar slid rearwards whilst the centre and forward panels slid in the opposite direction. The internal catapult was then rotated and the aircraft wings fitted.

Inset iii) shows details of the funnel and funnel platform. At either side was a large searchlight fitting astern of which was a single 2cm flak mount. Note the distinctive mainmast fitted abaft the funnel, with two large bracing struts. A quadruple 2cm flak was also mounted immediately astern of the mast.

F: *BISMARCK* IN ACTION

Bismarck is shown during her action with the Hood, having just fired a salvo at the British battlecruiser from her 38cm main armament. At 0545hrs on 24 May 1941, the first sighting of the enemy units *Hood* and *Prince of Wales* was made and *Bismarck*'s main armament swung to port and trained on the rapidly approaching enemy. The British warships were approaching *Bismarck* bow on, offering as small a target as possible, but at the same time allowing only their forward main armament to train on the enemy. *Bismarck*'s main armament opened fire at 0555hrs and found the enemy's range almost immediately. The German battleship fired a massive shell weighing around 800 kilos and within just two minutes one of these formidable shells smashed into *Hood* as she turned to port to bring her full broadside into play against the Germans. The strike started a fire in *Hood*'s magazine and 4 minutes after *Bismarck* opened fire, *Hood* exploded, breaking her back, and rapidly sank.

Bismarck had not gone unscathed in the action, however, being hit by three 14-inch shells from *Prince of Wales*, one of which holed her hull and allowed significant flooding, causing her to take a bow-down attitude. Although this did not affect her fighting capabilities, it caused her

commanding admiral, Günther Lütjens, to decide to abort his original mission and make for St Nazaire in France for repairs.

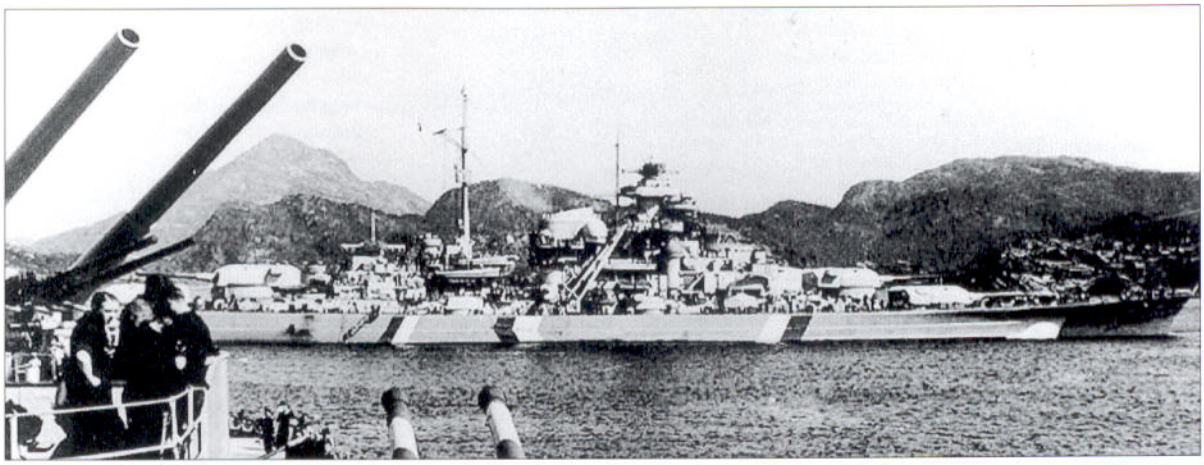
G: *TIRPITZ*

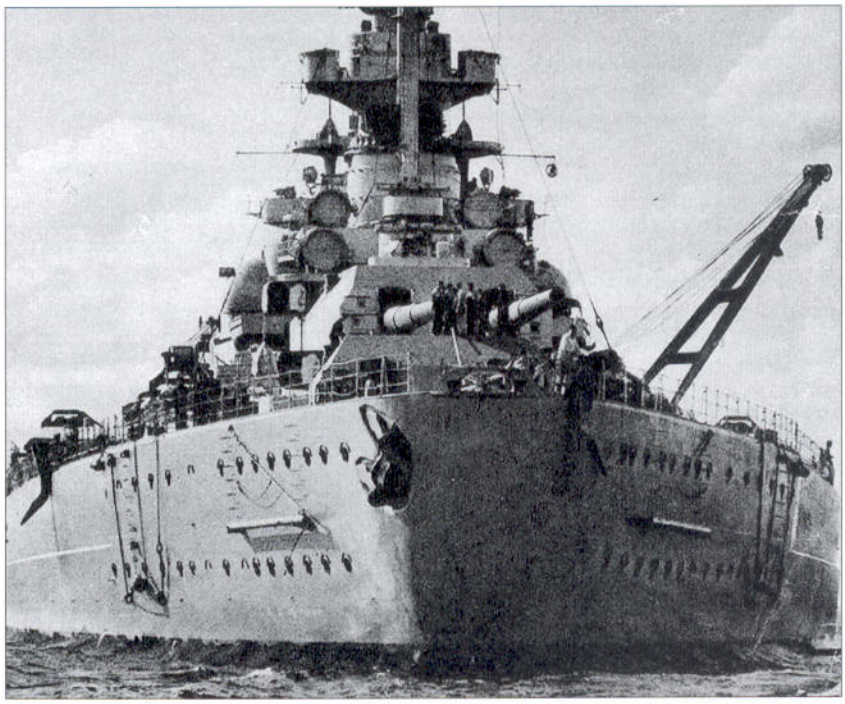
The *Tirpitz* is shown here in both profile (1) and plan view (2), in two-tone medium/dark grey disruptive 'splinter' pattern camouflage, with only the extreme ends of the hull finished in the pre-war pale grey colour. This was one of several camouflage schemes sported by *Tirpitz* during her career. Though they may appear rather gaudy when seen in colour paintings like this, they were in reality very effective in breaking up the ship's outline when seen from a distance. The *Tirpitz* ship's crest is an orange/black quartered shield with silver Viking ship prows facing in opposing directions in the upper and lower halves.

The *Bismark* and *Tirpitz* were remarkably similar in almost every respect. One major difference was that *Tirpitz* was fitted with a bank of torpedo tubes (see **inset I**)) on the main deck just abaft the aircraft catapult. Note also the searchlights and the quadruple 2cm flak guns on the funnel platform. The large rounded fitting on the forward part of the funnel is another searchlight, with its folding cover in place.

One further major difference between the two battleships was the much greater level of radar equipment fitted to the *Tirpitz*. This view (**inset ii**) of her foretop shows the mattress antenna for the FuMO radar system.

The *Tirpitz* was also fitted with quadruple 2cm flak mounts on the roof of turret 'Bruno' and also on the forwardmost part of the superstructure – see **inset iii**). Note the small connecting platform between the two flak mounts.





ABOVE ***Bismarck* is seen here still sporting her 'Baltic' camouflage scheme of bold black/white angular stripes. Note the darker area on the forward part of her hull, and the false bow wave painted where this meets the light grey of the major portion of her hull. This scheme was painted out before she set off on Operation *Rheinübung*.**

LEFT **The sheer bulk of *Bismarck* is clear from this stern view. The size of the turrets can be gauged by the crew figures standing on the roof of turret 'Dora'. The large derrick seen to starboard is used for recovering the ship's boats and the Arado floatplanes.**

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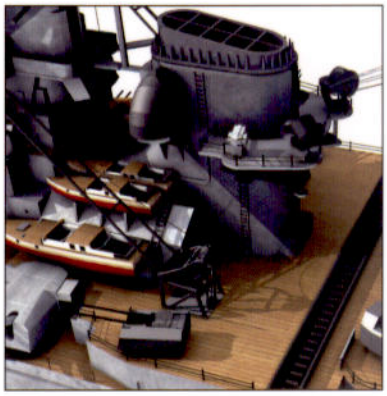

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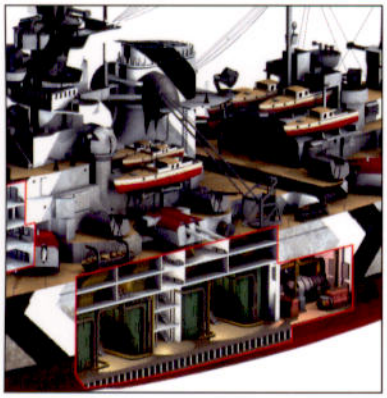

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